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Ocean-Going Motor-Driven Ship "Selandia"

THIS MOTOR-DRIVEN SHIP RECENTLY EXCITED GREAT INTEREST ON THE THAMES

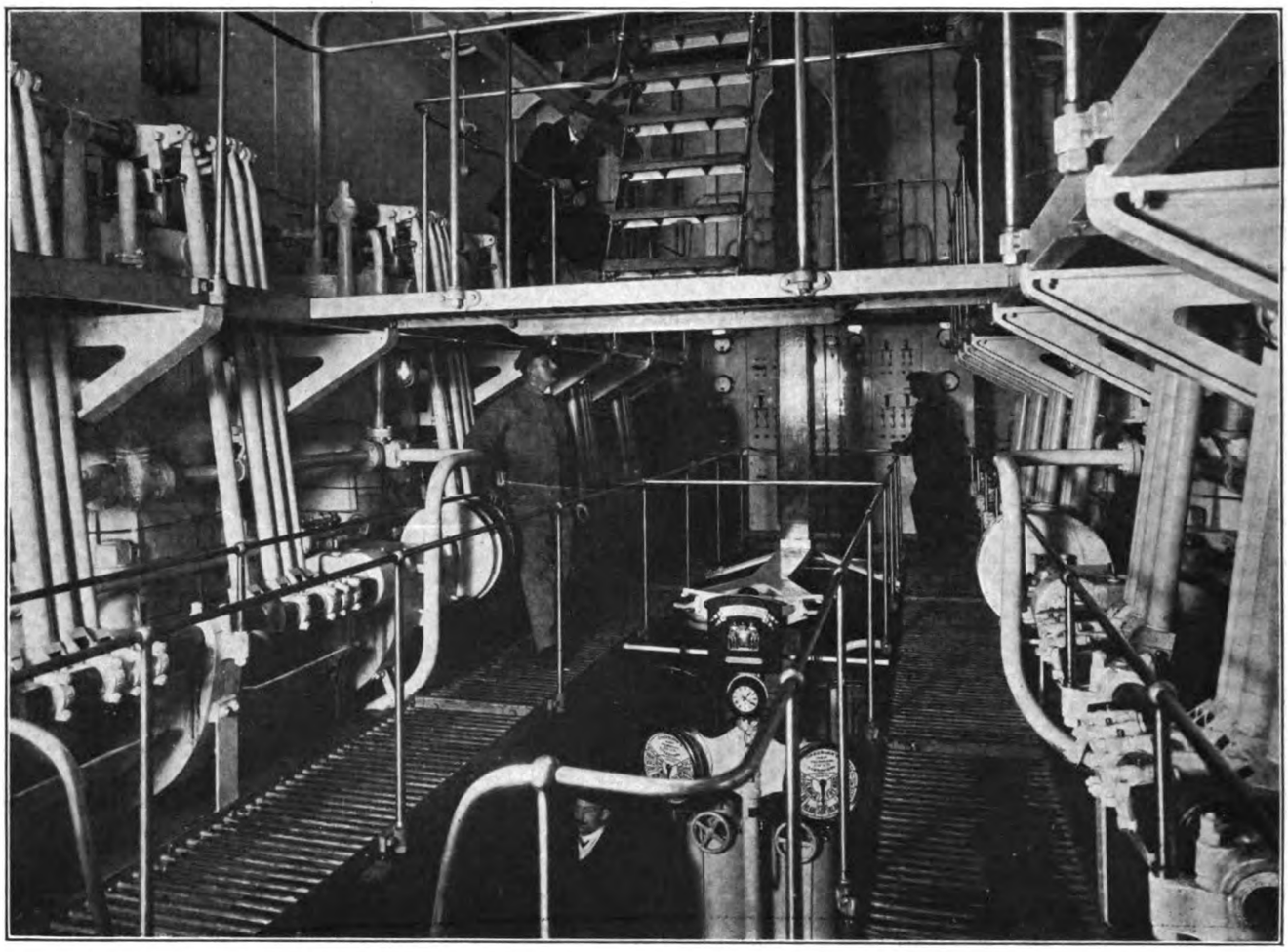
SELANDIA, by far and away the largest motor ship afloat, has done much to smooth the way of the oil engine by coming through her trials, which were held at Copenhagen, without a single hitch, and of which mention was made in the March issue of THE MARINE REVIEW. We have recently had a surprise by reading some of the dimensions of the oil-driven boats running in Russia, but when compared with Selandia, they lose their prominence. Selandia is the first of three large motor ships to be completed for the East Asiatic Co. of Copenhagen, who have before shown their confidence in the oil engine. She is the sister ship to Jutlandia, now under construction on the Clyde, and with the Fornia will probably be running her trials in April of this year.

Selandia is constructed as an awning-deck ship. She is 370 ft. in length between perpendiculars, 53 ft. in extreme breadth, and 30 ft. in depth, moulded to the upper deck. The gross tonnage is 4,900 tons and net register 3,200 tons. With a deadweight capacity of 7,400 tons, the ship has a displacement of about 9,800 tons. Loaded with 900 tons of fuel in the double bottom, in addition to about 30 tons of fresh water for drinking and cooking purposes and 30 tons of galley fuel, she made on her official trial, over a measured mile, 13.35 knots. When fully loaded, it is estimated that at sea she will average her 12 knots.

The propelling machinery consists of two main Diesel motors each of 1,250 I. H. P. The main motors are eight-cylinder Diesel motors, working on the four-stroke principle, and the number of revolutions at normal speed is 140 per minute. Reversing is by means of compressed air, and from full speed astern to full speed ahead can be executed in less than 20 seconds. When the motor by the reversing engine has been brought into the back-gear, the starting takes place by moving a handle, by means of which air of 20 atm. pressure is led into the cylinders through the starting valve, this commencing automatically to work when the compressed air is led in. When the engine by means of the air has attained a sufficient number of revolutions, which it does immediately, the handle is further moved, the air is shut off, the starting valves close themselves, the engine is oiled, and immediately works as an ordinary Diesel motor at the speed required, depending upon the position given to the handle which regulates the oil supply. The reversing is thus executed by means of two handles, corresponding to the two handles of an ordinary steam engine.

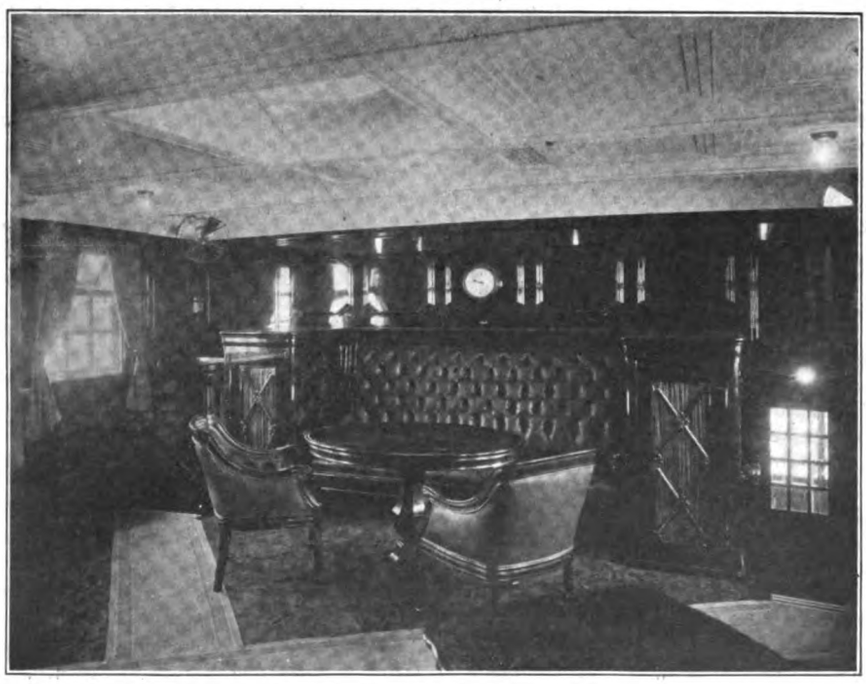
At sea the speed of the engine is regulated by an Aspinall's governor, acting so that when a sudden rising in the number of revolutions beyond the normal takes place, it shuts off the supply of fuel oil and does not open again until the revolutions have dropped down to the predetermined number. On the shaft is a small flywheel, only two meters diameter; this is provided with a toothed worm-wheel gearing in the periphery, which drives a worm, so that by means of an electric motor the main engines can always be turned.

On each main engine, there is an air



LOWER GALLERY OF THE SELANDIA'S ENGINE ROOM, LOOKING FORWARD

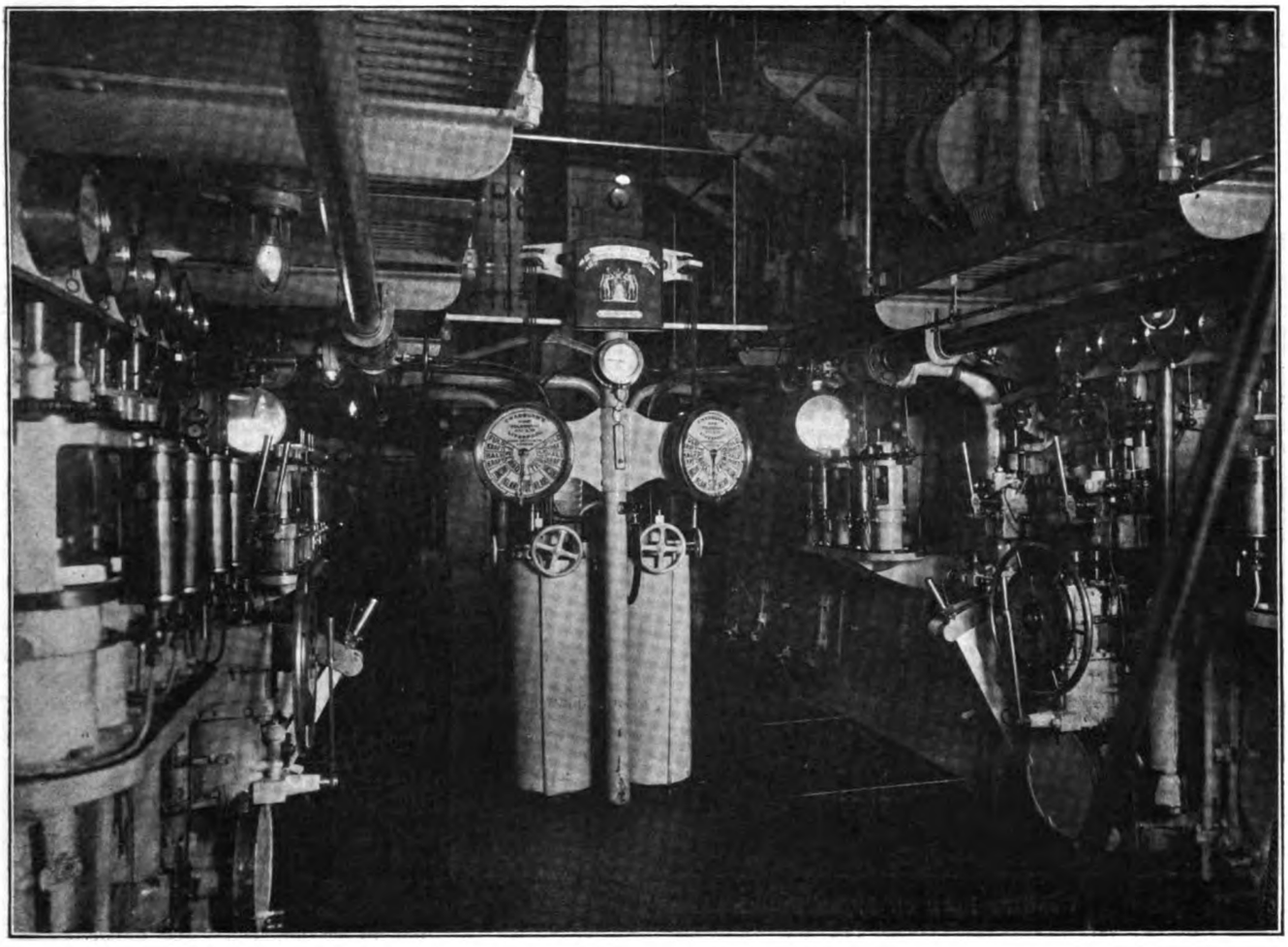
compressor, for injecting fuel oil into the cylinders, and they are so arranged that they can easily be adjusted for half or complete filling. Half filling is employed when both pumps are working at each engine. In case one of them should be damaged, the remaining pumps will be put on complete filling and will give sufficient air for injection of the fuel oil for both the main engines. As a stand-by, the exhaust valve at one of the cylinders of the main engine can be removed and replaced by a delivery valve, so that the cylinder can be brought to work as a compressor. In this case the motor only works with seven cylinders, but trials have proved that the reversing and working are nevertheless performed in an entirely satisfactory way in every respect.



SMOKING ROOM ON MOTOR SHIP SELANDIA

Auxiliary motors, each of 250 I. H. P., are furnished with a dynamo and an air compressor revolve at 230 r. p. m. The air compressor is calculated to supply air under a pressure of 20 atm., and it is utilized for reversing the main motors and also for furnishing the air compressors of the main engine with air for injection. When the vessel is at sea, it is intended that the current should be taken from the dynamo, which is placed on the same shaft, for lighting and for working the different auxiliary engines, such as winches, pumps, refrigerating machinery, etc. There are two auxiliary motors in order to always have one spare in case of emergency.

Among the auxiliary machinery there are two sets of electrical-driven lubricating pumps, circuit pumps, cold and

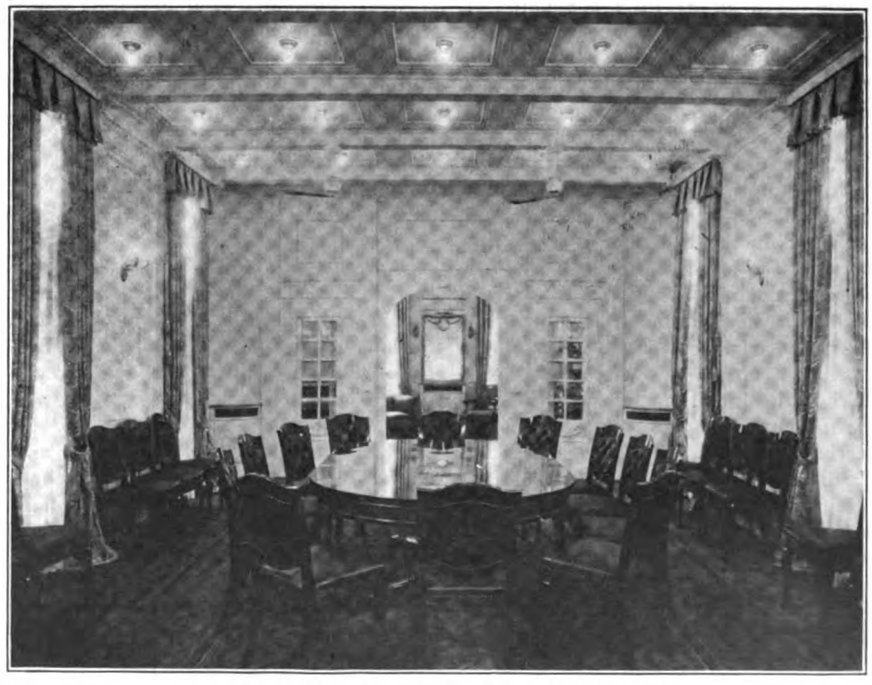


STARTING PLATFORM OF MOTOR SHIP SELANDIA, LOOKING FORWARD

hot water sanitary pump and bilge pump, in addition to a refrigerating machine, a donkey boiler for heating and steam-extinguishing in the holds and also for working a steam-driven compressor. The electric-driven lubricating pumps suck up the oil from the tank, which is placed in the bottom of the ship, through the main-bearings, thence through the crank shaft, connecting rod brasses, through the hollow-bored connecting rod to the cross-head brasses, from there through the piston rod to the top of the oil-cooled piston, back through the piston rod, finally injecting over the guide. Cooling the oil takes place on the guide-faces as these are cooled, and further cooling can be executed by pumping oil through an oil-cooler formed as a surface condenser. From the two compressors of the auxiliary motors, which are carried out as triple-compressors, pipes are led from the intermediate cooler with an air pressure of about 8 atm. to the siren, which is fitted on the mast.

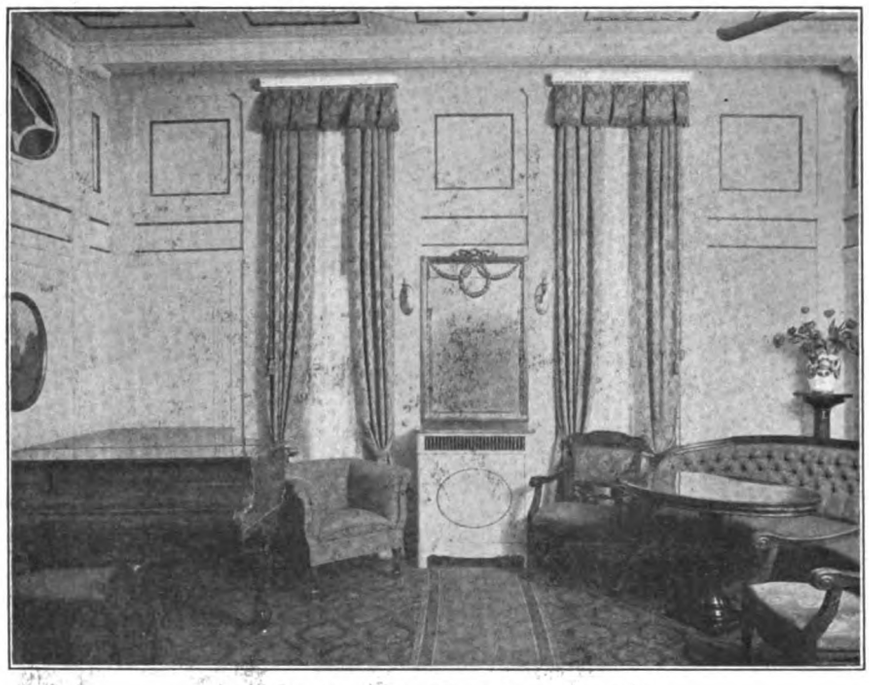
In the top of the casing two settling-tanks are arranged, to which fuel oil can be pumped from an air-driven pump in the engine room; each tank is of such dimensions that it contains sufficient oil for 12 hours normal work. The purpose of these tanks is to have the water separated from the oil here, so that comparatively clean oil will be led to the motors.

There are four cargo hatches; two forward, one abaft the passenger accommodation, and one abaft the engine room. For this arrangement there are



DINING ROOM ON MOTOR SHIP SELANDIA

12 electric winches, eight nominally to lift five tons and four smaller ones to lift one and one-half tons. However, since the five-ton winches have electric motors of about 40 b. h. p., their capacity is well under-rated. All the hatches are provided respectively with two



DRAWING ROOM ON MOTOR SHIP SELANDIA

five-ton winches, and the forward and aft hatches each have two one and one-half-ton winches. On the foremast a spare room can be rigged to hoist 25 tons. All these winches have "controllers" in watertight boxes; the motors are tightly encased and an examination of the work shows little possibility of damp causing any inconvenience or trouble. Each winch has a big lever, similar to that usually fitted to a steam winch, so that the operation and control will not in any way be different to that of a steam winch. The drive from the electric motor being by worm gear to an intermediate shaft, and then by further reduction gearing, there is no necessity for a brake, the resistance in the gearing being sufficient to prevent running back. On the Clarke-Chapman electric anchor windlass, however, there is a brake provided, owing to the very different load that comes upon it. An electric motor also forms part of the steering engine, the Hele-Shaw and Martineau hydraulic-electric system of steering having been adopted. In so far as the steering engine moves in exact ratio to the angle through which the steering wheel is turned, this hydraulic electric will probably appeal to steamship owners.

As already stated, the Selandia is constructed as an awning-deck ship, with forecastle and poop, a structure above the engine room and a cabin erection amidships. The whole of the midship erection, which is intended for passengers, is carried out, as will be seen in the accompanying illustration, in a specially fine yacht style, all executed to the drawings of Mr. Brummer, the architect, who has carried the work through according to ideas based upon the experience of the East Asiatic Co. The large and bright cabins and rooms of the ship rather impress upon one the feeling of being more at home than on a ship. The cabins are of exceptional size, and each of them is fitted with a mechanical sofa, which can be made up as a bed. The furnishings also include a wash stand, writing table and chairs. It must be clearly understood that there is a total absence of vibration, and practically no noise whatever impress a passenger. There are double cabins for two passengers and single cabins for one. The bathrooms are arranged so that there is direct access from two cabins to a common bathroom. There is also a large and elegant dining saloon and a ladies' saloon, all in white. The saloons are situated on the deck, so as to provide natural light and air. The space aft of the dining saloon forms a hall, and a staircase gives access to the rooms above, where is found a smoking saloon and several specially equipped and furnished rooms, which combine sleeping room and sitting room. Forward of these rooms is the captain's cabin and chart room.

Moreover, there is a wireless telegraph on board, and an extra smoking room which is exclusively reserved for the officers of the ship. On the whole, everything has been done to procure as fine, tasteful and convenient rooms as possible without attempting anything in the way of superfluous luxury. Messrs. Burmesiter & Wain, who have built the ship and constructed the engines, have carried out their work splendidly and to conclude an article without mentioning that everywhere and everything on and throughout the ship has been carried out in perfect style is altogether out of the question. They have executed their work well and judging from the many orders that they are now receiving, they are being amply repaid for their industry.

Many famous engineers visited the Selandia on her arrival at the West India Dock, London. A rather curious remark was heard by a press representative when a river man exclaimed as she was making her way up the Thames, "There goes some poor captain, who has had bad weather in the Channel and lost his funnel." She has fortunately arrived in London at a time when there threatens to be a great coal strike, and naturally has been the means of drawing much attention, for no coal strike will effect her. She has enough liquid fuel on board to take her to Bangkok and back. That great shipbuilding companies are now beginning to realize the possibilities of the oil-driven vessel is not to be doubted. The motor vessel has already become a serious rival to the steam-propelled vessel. On her way over from Copenhagen Selandia behaved, as she did on her trials, splendidly and although she encountered a gale on the journey, she not in the least distressed, she rode it as though it were a calm. From a passenger's point of view, who made the journey from Copenhagen, the most noticeable feature was the entire absence of vibration. From London she will proceed to Genoa and Port Said, and thence on to Bangkok. This is no experimental trip. It is a regular voyage proceeding under ordinary conditions, and calculated to prove that the oil engine is as efficient in regular sea-going works as the steam engine.

The board of state harbor commissioners of the state of California has approved plans and specifications for the construction of piers 30 and 32 to be built on the San Francisco water front, at an estimated cost of $1,000,000. The proposed structures have already been assigned to the American-Hawaiian Steamship Co., and will be occupied by them when completed.

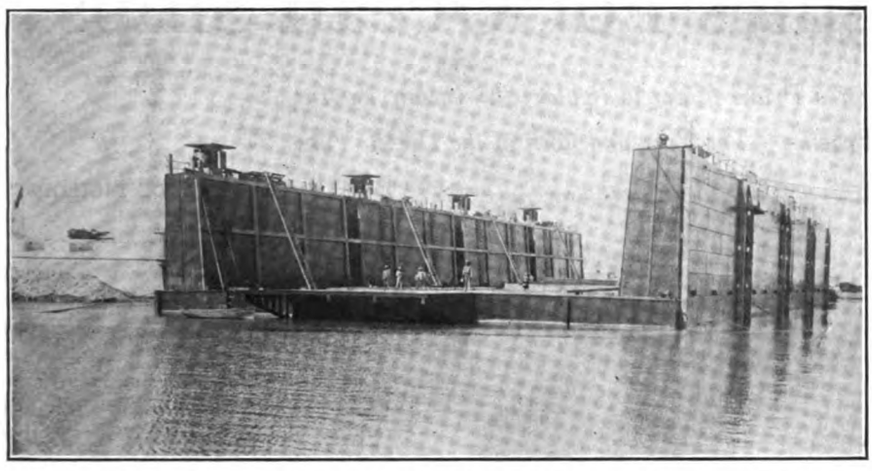
The number of passengers carried on the great lakes during 1911 was 16,794,722.

New Steel Floating Dry Dock

Description of a Sectional Dock Being Constructed at Puerto Cabello for the Venezuelan Government

A SECTIONAL steel floating dock is being constructed for the government of Venezuela, at Puerto Cabello.

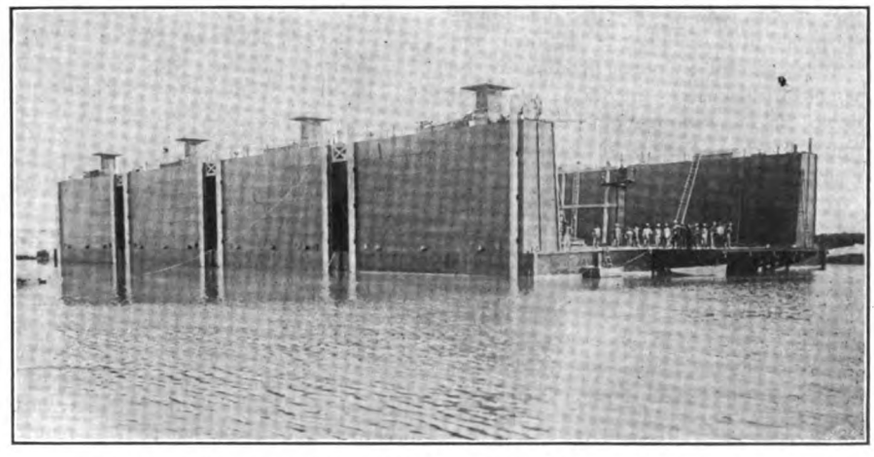
The dimensions of this dock are as follows:



INTERIOR VIEW OF PUERTO CABELLO SECTIONAL STEEL FLOATING DOCK

Total length over all, 282 ft.; outside width, 110 ft.; inside width, 90 ft.; depth of pontoon at center, 7 ft. 4½ in.; height of wings above deck, 25 ft.; height over all, 31 ft. 6 in.; number of sections, 4; size of sections, 60 ft. by 110 ft.

This floating dock is designed to lift 3,000 gross tons, and will handle a vessel 300 ft. long—drawing 17 ft. The structure is self-docking, each one of the four sections being complete in itself, wings and pontoon. The pumping outfit is composed of 24 8-in. vertical centrifugal pumps. Each of these pumps is driven by means of a direct connected motor, Allis-Chalmers make. The motors are 60 cycles, 3-phase, 110 volts, 10 H. P. alternating current. The generator supplying these motors will be located on shore, and will be so arranged that connection can be made to any or all of the sections. All the pumps on each section are controlled from one switchboard, operated by one man. This pumping system will discharge 1,540,056 gallons of water in 53 minutes. Additional to this pumping system will be installed a line of 24 steam syphons. These latter will eject the water to a very low limit and thus insure the full lifting capacity. The valves and sinking gates are so arranged that no water enters the wing tanks, unless a draught greater than 11 ft. over the keel blocks is desired. Also in docking a deep vessel of no great weight all the water in the wing tanks will be discharged by gravity, thus saving time and work for the pumps. The air chambers, situated in the two side wings, will have a displacement sufficient to hold the dock at its maximum limit of submergence. The amount of steel used in construction is 3,388,519 lbs. This includes 496,260 units and 38,884 separate pieces of steel. Open-hearth steel satisfying all required marine tests, is used throughout.



EXTERIOR VIEW OF PUERTO CABELLO SECTIONAL STEEL FLOATING DOCK

The steel was prepared at the Edge Moor plant of the American Bridge Co., and so carefully was the work planned and executed that an astonishingly small amount of reaming was found necessary to insure fair holes for riveting. This was the more surprising when the fact is taken into consideration that there was much four-ply work, which requires that the centers of four rivet holes must coincide to allow of the entrance of one rivet. In fabricating this material it was necessary to punch and drill 1,159,817 holes for rivets—about 37¼ tons of steel punchings.

The riveting was mostly done by compressed air, an Ingersoll-Rand tandem compound compressor being used with a capacity of 600 cu. ft. of free air per minute—sufficient to drive about 20 hammers and drills at 100-lb. pressure.

The Rockwell Mfg. Co. oil-burning rivet forges were employed to heat the rivets.

This dock has five longitudinal bulkheads, these, together with the dock sides, terminate at each end with heavy angle connections, thus joining the connections between the several sections, also of the movable outriggers.

Connection is also provided at the wing tops to take the stresses of compression, tension and torsion. The erection of this dock was begun Dec. 15, 1910, and most of the work was done by native mechanics and laborers, the latter mostly prisoners. The New York importing and exporting house of Manuel Ayala, who was one of the contractors, furnished all the material used in the construction and installation of this work. The official contractor was Senor Ildijouso Agaerrevere, a prominent citizen of Caracas.

The dock is intended to form a part of the plant of the National Naval station, already well equipped. The de-

signor and constructing engineer of the dock was Charles N. Crowell, who also constructed a composite dock at this same port in 1906, for the Pusey & Jones Co., of Wilmington, Del., contractors for the Venezuelan government. The designor of this former dock was Mr. Horace H. Thayer Jr., of Wilmington, Del. Mr. Crowell has been for several years making a specialty of dry dock construction, having drawn plans for two in New York and had charge of the construction of the large dock of the Ollinger & Bruce Co., of Mobile, Ala., and also of the one built later at Orange, Texas, for the New Orleans Dry Dock & Shipbuilding Co., of which Mr. Walter Thompson was superintendent.

The engineer of this present work was ably assisted by Senor Eliseo Gonzalez, an expert in this line of construction, he having superintended the construction of the large Besant dock at Havana. Senor Gonzalez's services were all the more valuable owing to his thorough knowledge of the Spanish language. Accompanying this article are two photographs showing the present state of completion of this project. The dock needs but the installation of the electric plant on shore to be ready for business.

Diesel Engines For Ocean Ships

The Search for a Prime Mover to Replace the Steam Engine in Marine Practice—The Pros and Cons of the Diesel Type

By George Sherwood Hodgins

RECENT newspaper paragraphs to the effect that Germany has lately been experimenting with a form of internal combustion engine, exclusively for the navy, has aroused interest in the Diesel engine as applied to sea-going ships. Germany is said to have designed an engine having three double-acting cylinders each producing 2,000 H. P., one cylinder to each propeller shaft.

In a paper by J. T. Milton, he says that fuel economy is the real reason which has caused ship builders to entertain the idea of using any other form of power than that supplied by the tried and trustworthy steam engine. Fuel economy alone would, however, not be a sufficient reason for the change. Efficiency, fully as certain as that of the steam engine is also required and the newer engine in the field must show as little liability to accident, and it must present as much opportunity for temporary repairs, in case of break down, as the steam engine does, and it must have a fairly low maintenance charge.

An internal combustion engine, using oil has advantages over an engine using gas made from coal. One of these is the doing away with bulky gas producers and scrubbers, and there is no trouble with dust in the cylinders. When compared with coal, weight for weight, oil has about 50 per cent higher evaporative efficiency. Oil occupies much less space than coal does, and it can be carried in double bottoms of ships and other places not suitable for cargo. When burned, it produces a higher temperature and therefore, with a given boiler, more power can be obtained than that derived from the same boiler using coal. No fire cleaning is required with oil fuel and it can be pumped on board very easily and so avoids the labor and dirt incident to coaling a ship. It is very satisfactory for vessels which ply regularly between ports where oil can be obtained, but for tramp steamers which go all over the world, coal is still necessary.

DR. RUDOLPH DIESEL

Dr. Diesel is now on a visit to this country to appear before various engineering societies.

It is said that oil-producing areas are distributed all round the globe and if there was a steady demand for fuel oil commercial enterprise would soon place it regularly on the market wherever it was wanted. Safety requires that only oils having a comparatively high flash-point should be used on ships. If oils having a comparatively low flash-point are used in the closed cylinders of engines instead of in ordinary boiler furnaces there is not the same need for high flash-point. Experience has shown that even petrol can be safely carried on board ship. If internal combustion engines of the oil-burning type are to be used extensively in sea-going ships, crude oil will be the fuel most generally employed, instead of the residues from distillation. It is claimed that the Diesel engine can use any form of oil that leaves no residue. If this is so, experience will determine the adjustments of the fuel valve so as to obtain suitable combustion for each, in order to consume them slowly enough to prevent an undue rise of temperature and yet to secure their entire combustion.

Hydrocarbon oils, natural or distilled from brown coal, ordinary coal, or crude oil, differ in their behavior when raised to a high temperature. One class when used in the Diesel engine decomposes into free hydrogen and heavier hydro-carbons. The other class first vaporise or partly vaporize. In those of the first-mentioned class, the hydrogen burns first and the resulting heat enables the hydro-carbons to be burnt. In the second class, a high temperature is required to start combustion which approximates to an explosion in order that such oils may be properly consumed. Dr. Rieppel states that even these oils may be used in a Diesel engine if it is designed to suit the conditions they impose. Distilled oils are in general, not suited for this engine. Oils made from brown coal or natural crude oils are the most suitable. Some of the crude oils, and all the residues from their distillation, contain combined sulphur. This, at high temperatures, has an affnity for copper, and oil containing sulphur cannot be used with pipes, fittings or valves made of copper or copper alloys. Cast iron resists the action of these oils and has given good service where brass has failed. Fuel pipes should be made of steel or iron for this reason.

Lloyd's rules for fuel oil bunkers

have been well founded. Under these rules, heavy oils with a flask-point of not less than 150 degrees Fahr., when used for boiler fuel may be carried with safety. Gas arising from them, even at tropical temperatures, is practically negligible. Provision for leakage of oil from any oil fuel compartment must be made. Fore and aft peak tanks and double bottoms under cargo holds may be safely used. If engine oils having a low flash-point, or which give off gas, are used, it is not desirable to carry them under cargo holds, or where leakage would permit vapors to penetrate the cargo holds or into other closed spaces. Some hydro-carbons have an objectionable odor which may contaminate many kinds of merchandise. At the present time petrol may safely be carried in bulk and therefore provision can be made, with proper care, so that any kind of oil may be carried without risk to vessel or cargo.

Brake Horsepower

In an ordinary steam engine the power is usually given as indicated horsepower. This includes the friction of the machine, the movement of the slide valves and the pumps. In round numbers about 85 per cent is obtained as useful work. In the Diesel engine the indicated horsepower has to overcome the friction of the mechanism for actuating the valves, compress air for the injection of the fuel, and in the two-stroke cycle engine it has to supply power to work the scavenging pump. All these together use up more power than the accessories of the steam engine do, so that a less proportion of the indicated horsepower goes to the shaft than it does where a steam engine is used. For this reason, Diesel engine power is usually expressed as brake horsepower. If a steam engine has a consumption of 1.25 lbs. I. H. P. per hour, this corresponds to about 1.47 lbs. B. H. P. The fuel for a Diesel engine would therefore be 28 per cent of the coal for the steam engine.

There are many different arrangements used by makers for supplying the scavenge air. The volume of scavenge air pumps is considerably greater than that of the cylinders, the usual proportion being not less than 1.8 and as the full volume of scavenge air must pass from reservoir to cylinders every revolution, the pressure of this air depends upon the size of the scavenge air valve openings. Large openings give low pressure; small valve openings produce high pressure. The larger the openings the less power required to operate the scavenge air pump. In some designs this pressure is from 7 to 8 lbs. per sq. in., and in others it is between 3 and 4 lbs. per sq. in.

TABLE OF LARGE OIL-ENGINE INSTALLATIONS BUILT OR NOW BUILDING FOR OCEAN-GOING SHIPS EXCLUSIVE OF TOILER AND VULCANUS

Constructors of Engines.	Type of Ship.	Gross Tonnage.	Horse-Power.	Number and Diameter of Cylinders.	Stroke. in.	Type of Engine.
Schneider	Cargo (France)	4,920	1,800	8 of 17.72 in.	22.05	Carel 2-cycle single-acting T.S.
Blohm & Voss	Cargo	3,500	1,700	6 of 18⅞ in.	25.50	Nurnberg 2-cycle double-act'g S.-S.
Burmeister & Wain*	Cargo passenger (Selandia)					B. and W. 4-cycle single-acting T.-S.
Barclay, Curle, & Co.	Ditto (Jutlandia)	4,910	2,500	16 of 20.87 in.	28.74	
Nederlandsche	Oil-carrying	2,200	1,100	6 of 22.05 in.	39.4	Spoorweg 4-cycle single-acting S.-S.
Krupp	Oil-carrying					Krupp 2-cycle single-acting T.-S.
Krupp	Oil-carrying	4,500	2,300	12 of 18.7 in.	31.5	
Krupp	Oil-carrying	10,800	3,500	12 of 22.45 in.	39.4	Ditto.
Cantiere Officine Savoia	Cargo	500	300	4 of 9.6 in.	15.75	2-cycle single-acting S.-S.
Richardsons, Westgarth	Cargo	3,200	1,000		5—	Carel 2-cycle single-acting S.-S.
Clyde Shipbuilding Company	Cargo Canadian Lakes	2,640	.....	4 of 18.1 in.	32.28	Ditto.
Burmeister & Wain†	Cargo and passenger	8,500	6,000	24 of 24.8 in.	31.5	4-cycle single-acting twin or triple-screw.
Burmeister & Wain	Cargo					4-cycle single-acting T.-S.
Burmeister & Wain	Cargo	3,380	.....	16 of 19.69 in.	25.98	
Aktiebolaget Diesels Motorer‡			1,000	6 of 17.72 in.	21.27	2-cycle single-acting S.-S.

In small single-acting engines the pistons are usually not water-cooled nor oil-cooled. The water-cooled cylinder walls keep down their temperature sufficiently. A heated piston is not so very objectionable in Diesel engine, for pre-admission cannot occur. The principal objection is that, with a large piston, overheating may cause structural weakness. Expansion of the metal renders it necessary to make the piston crown initially smaller than the cylinder bore. This is by no means advantageous with engines having no piston rods.

Highly Compressed Air Required

Highly compressed air is required in all types of these engines, for starting and for fuel injection. Three-stage compression is usual, and the air is cooled at each stage. The compressor volume provides for the storage of a small surplus at each revolution, above that required for fuel admission in continuous working. This surplus is stored in a battery of seamless steel bottles tested to 120 atmospheres. A safety valve set at 60 atmosphere is provided. The work of compression is done by an air compressing plant worked by the main engine. The whole system has to be drained of the moisture condensed during compression.

Comparing single-acting engines of the two-stroke type, and the four-stroke type, many points arise which only extended experience can decide. An engine is being built, and is probably now finished, on the four-stroke system, in which the greater portion of the exhaust passes out of the cylinder through ports, as in the two-stroke engine, leaving only a part of the burnt gases to be pushed out of the cylinder through the ordinary exhaust valves.

In steam ships, besides the driving machinery, there are a number of auxiliary appliances. These have to be provided for when Diesel engines are used. The more important of them are: (1) Steering gear; (2) the whistle; (3) donkey pump for bilge and fire service; (4) electric light machinery; (5) distillers; (6) steam heating apparatus; (7) water ballast pump; (8) winches; (9) windlass; (10) ventilating apparatus in passenger vessels.

The first six and the tenth are always required at sea. Probably the best way is to work the others by steam from a donkey boiler fired with fuel oil, as they are only neded at or near port. The electric light machinery can be worked by a small oil engine of the Diesel or other type, using the same kind of fuel as the main engine and thus obtaining the same economy in operation. This engine might also be used for operating bilge and fire pumps. The ventilating machinery can be electrically driven, the electric light engine, being used for this purpose. The baliast pump may be a steam pump worked by steam from the donkey boiler, or it may be operated by a small separate oil engine.

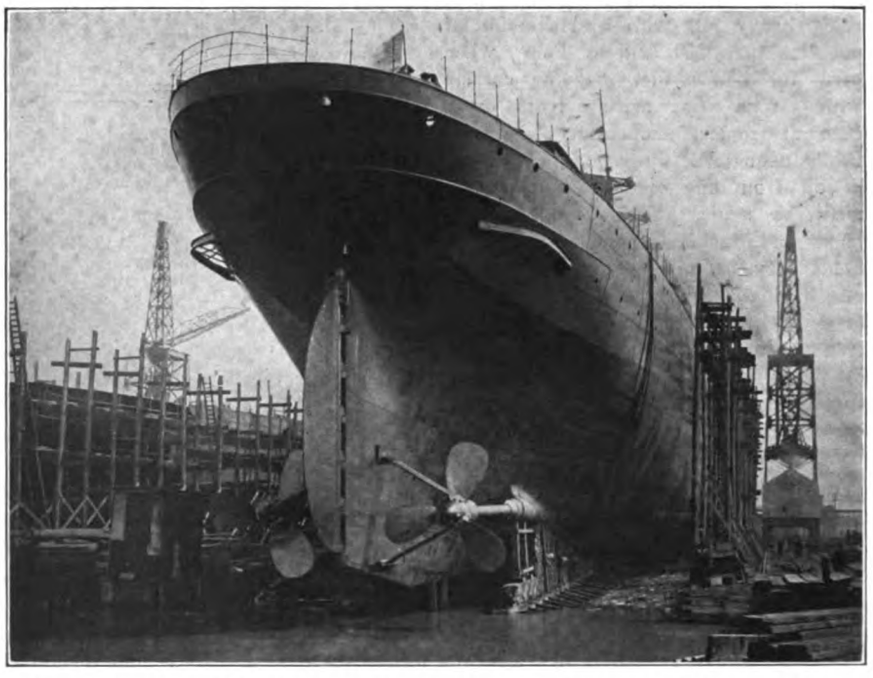
Auxiliary Alternatives

Three alternatives present themselves for working the steering gear. (1) A donkey boiler may be provided, fired with oil fuel and kept continuously at work while the ship is at sea. (2) Utilizing the heat of the exhaust gases by passing them through an auxiliary boiler and so generating steam. (3) Working the steering gear and whistle by compressed air from the first stage of the compressor, which, in this case, would have to be made sufficiently large for the purpose.

The method of using the heat of the exhaust gases to generate steam has much to recommend it. According to Prof. Clark's tests, nearly one-third of

the total heat of combustion passes off this way. In the four-stroke cycle engine, these gases have a temperature of about 700 degrees Fahr. and are capable of economical use for steam generation. In the two-stroke cycle engine, on account of the mixing of the hot gases with the excess of scavenging air, the temperature of these gases is probably not above 400 degrees Fahr.

Considerations as to the accessibility of the working parts of the Diesel engine will have to occupy the attention of builders, much more than is now evidenced in some designs. Every part of the engine requires periodic inspection and adjustment. The ability to readily get at various parts is of great importance. Provision must be made for the possibility of renewing the crank-shaft without lifting the engines out of the ship. "In short, the Diesel marine engine should be Diesel only as regards the cylinders and their accessories, and should be of the ordinary marine type as regards all the rest of the engine."



LAUNCHING NAVAL COLLIER ORION AT THE MARYLAND STEEL CO.'S YARD, SPARROWS POINT, MD.

Launch of Collier Orion

The steel collier Orion, building for the United States navy, was launched from the yard of the Maryland Steel Co., Sparrow's Point, Md., on March 23, being christened by Miss Evelyn Taylor, daughter of Charles S. Taylor, superintending constructor for the government at Sparrow's Point. The principal particulars of the Orion are as follows:

Length, over all, 536 ft.
Length between perpendiculars, 514 ft.
Beam, molded, 65 ft.
Depth, molded, 39 ft. 6 in.
Draught on trial, 27 ft. 7½ in.
Deadweight on trial, 12,750 tons.

The Orion is built on the Isherwood system and is the first vessel of the navy to be so constructed. There are six main cargo holds for coal and four holds for oil fuel. Oil fuel can also be carried in the double bottom under the cargo holds. The double bottom also extends under the machinery space and peck tanks are fitted forward and aft.

The machinery of the Orion consists of two triple-expansion engines, 27, 46 and 76 in. cylinder diameter by 48 in. stroke, supplied with steam from three double-ended boilers, 15 ft. 10½ in. diameter by 21 ft. 2½ in. long, allowed 200 lbs. pressure and fitted with Howden draught. There is also a donkey boiler, 8 ft. in diameter and 10 ft. 6 in. long, allowed 200 lbs. pressure. The Orion has 11 hatches and will be equipped with coal-handling gear, capable of unloading coal at the rate of 100 tons per hour per hatch. This gear will be of builders' design.

The Orion will carry a crew of 152 men and 25 officers. The officers' quarters will be finished in oak and the crews' in cypress. The keel of the collier was laid on Oct. 6, 1911, so that her launching occurred exactly five months and 17 days after laying the keel. This is very smart work indeed.

The keel of the Jason, sister ship of the Orion, was laid on March 25, two days after the Orion left the ways.

Preserving the Independence

As the result of efforts on the part of a number of public spirited citizens of California, backed by the officials of the Panama Pacific International Exposition, the navy department has rescinded its order putting the old battleship Independence on the junk market and has ordered that the old-time fighting craft be preserved for exhibition at the exposition in 1915. The original order of the department directed that the Independence be sold at auction on March 31.

The craft has a remarkable history and is one of the finest commentaries on the work of early shipwrights in existence. She was the first 74-gun line-of-battle ship put out against the fleets of Great Britain and her timbers have never been changed, and according to the report of a recent board of survey are in as good condition as when placed in the hull. The Independence was sent around the Horn at about the time gold was discovered in California and has been for years the receiving ship at Mare Island. The craft is rated as the oldest vessel in the navy today. Her length is 189 ft., beam 51 ft. 6 in., and depth 21 ft. 6 in. Her value, according to the United States register of 1909, was $7,415.

Motor Driven Ship Selandia

Editor MARINE REVIEW: In your March issue I find, under the heading, "British-Built Diesel Engines," an error, which I will ask you kindly to correct. The Selandia was not, as stated in the said article, built by Messrs. Barclay, Curle & Co., Ltd., on the Clyde, but by Messrs. Burmeister & Wain, of Copenhagen, Denmark.

The Danish East Asiatic Co., of Copenhagen, ordered three motor-driven ships to be built, all engined by the Burmeister & Wain Diesel motor. Two of the ships, among which the Selandia, were built by Burmeister & Wain, and one, the Jutlandia, by Messrs. Barclay, Curle & Co., Ltd., but the engines for all three boats are delivered by the Danish firm.

The Selandia was the first ship completed, and is, I believe, the first ocean-going, motor-driven ship.

Yours very truly,
W. HOVGAARD.
Professor of Naval Design and Construction.
Boston, March 21.

The Red Star Line has contracted with Harland & Wolff, Belfast, Ireland, for an Atlantic liner to be 670 ft. long and to be superior in speed to any of its vessels now in the New York-Antwerp service.

American Boiler Manufacturers

The Twenty-fourth Annual Convention of the Association at New Orleans—List of Valuable Papers Read

THE 24th annual convention of the American Boiler Manufacturers' Association was held at New Orleans on March 12, 13 and 14, being called to order by Secretary J. D. Farasey, of Cleveland in the absence of President E. D. Meier, whose train was late. He introduced the second vice president, J. Don Smith, of Charleston, S. C., who presented Mayor Behrman, of New Orleans. The mayor welcomed the delegates and related what New Orleans is doing to put itself into a state of preparedness for the new trade, which is sure to follow the opening of the Panama canal. W. H. Bateman responded in behalf of the association and James W. Porch, president of the New Orleans Progressive Union, made a vigorous address on the possibilities of the south. By this time Col. Meier's train had arrived and he responded to Mr. Porch.

Cleveland was selected as the city in which to hold the next annual convention and officers were re-elected as follows: E. D. Meier, New York, president; J. D. Farasey, Cleveland, secretary; Jos. F. Wangler, St. Louis, treasurer; T. M. Rees, Pittsburgh, Pa., first vice president; J. Don Smith, Charleston, S. C., second vice president; W. A. Brunner, Phillipsburg, N. J., third vice president; H. D. Mackinnon, Bay City, Mich., fourth vice president; M. H. Broderick, Muncie, Ind., fifth vice president.

A consistent campaign will be waged during the year for new members, as the association has only an enrollment of 25 per cent of the boiler manufacturers of the United States.

Paper on Rivets

David J. Champion, of the Champion Rivet Co., of Cleveland, presented a paper on "Rivets", which will be found elsewhere in this issue. His paper brought out an unlisted paper on "Hydraulic Riveting", by H. J. Hartley, of Cramps, Philadelphia, which is also reprinted elsewhere.

In the absence of H. A. Beale Jr., George Thomas, of the Parkesburg Iron Co., presented a paper on the "History of Charcoal Iron and the Manufacture of Charcoal Iron Boiler Tubes". In this paper he traced the early production of charcoal iron from the ore to present practice of making it from wrought and steel scrap. The principal use of charcoal iron in America is for iron roofing and boiler tubes, for which latter service it has the advantage of not crystallizing under shock, that it is ductile, non-corrosive and will not pit.

J. Jay Dunn, of the Shelby Steel Tube Co., Elwood City, Pa., read a paper on "The Manufacture of Seamless Steel Boiler Tubes". This paper described the process of manufacturing seamless steel boiler tubes by the method now most generally in use, briefly mentioning processes that have now been superceded. The real beginning of the present process of manufacturing seamless steel boiler tubes was the discovery of Mannesmann that a round bar of heated metal revolving by frictional contact produced a hollow cylinder, which could be worked into a commercial tube. He described the method of manufacturing seamless steel tubing by the piercing and cold-drawn processes and gave comparative figures relating to the strength and ductility of hot and cold-drawn tubing.

Segregation in Steel

Charles L. Huston, vice president of the Lukens Iron & Steel Co., read a paper on "Segregation in Steel". Segregation occurs from two main causes: One is from expulsion by "selective freezing" of the steel; the steadily accumulating wall of solidified steel at the outer portion near the mold constantly into the liquid portion the hardening elements or metalloids, such as carbide of iron; the other is from a tendency in these metalloids to float towards the top by reason of the difference in specific gravity.

G. F. Jeter, supervising inspector of the Hartford Steam Boiler Insurance Inspection Co., spoke on "Boiler Explosions, Their Causes and Prevention". He said that the public and many engineers assumed that most explosions are caused by some mysterious influence which cannot be foreseen or guarded against, but as an actual fact a definite cause can be given for most explosions of considerable violence. That a large percentage of boiler explosions are from causes that might have been foreseen and prevented is a well-established fact.

W. H. S. Bateman read a paper on "The American Boiler Manufacturers' Association as It Is and as It Should Be". He related the early conditions of the industry and suggested that the society be divided into five sections as follows: Marine boiler, water tube boiler, return tubular boiler, including small fire box boilers; house heating, miscellaneous boilers and pressure tank builders' section, and locomotive boiler.

Thomas Aldcorn, of the Chicago Pneumatic Tool Co., New York, delivered a paper on "The Use of Compressed Air in Boiler Shops". This paper dealt more with installation than use.

H. C. Meinholtz, of the Heine Safety Boiler Co., St. Louis, Mo., presented a paper on "Modern Boiler Shops and How They Should Be Equipped". In connection with his paper, Mr. Meinholtz exhibited lantern slide views of the new plant of the Heine Safety Boiler Co., recently erected at St. Louis.

Uniform Inspection Laws

L. E. Connelly, of the D. Connelly Boiler Co., Cleveland, made an earnest plea for the passage of uniform laws for boiler inspection in the United States and Canada. He gave a practical illustration of hardship in loss of time and money in a case where a boat was built for work in one harbor and upon being towed to another was ruled out of commission because of different requirements as to the boilers.

The convention was brought to a conclusion by a banquet at the St. Charles, Col. E. D. Meier acting as toastmaster. The principal speech was delivered by J. W. Porch, who drew a convincing picture of the utter decadence of the American merchant marine and the great need of American ships.

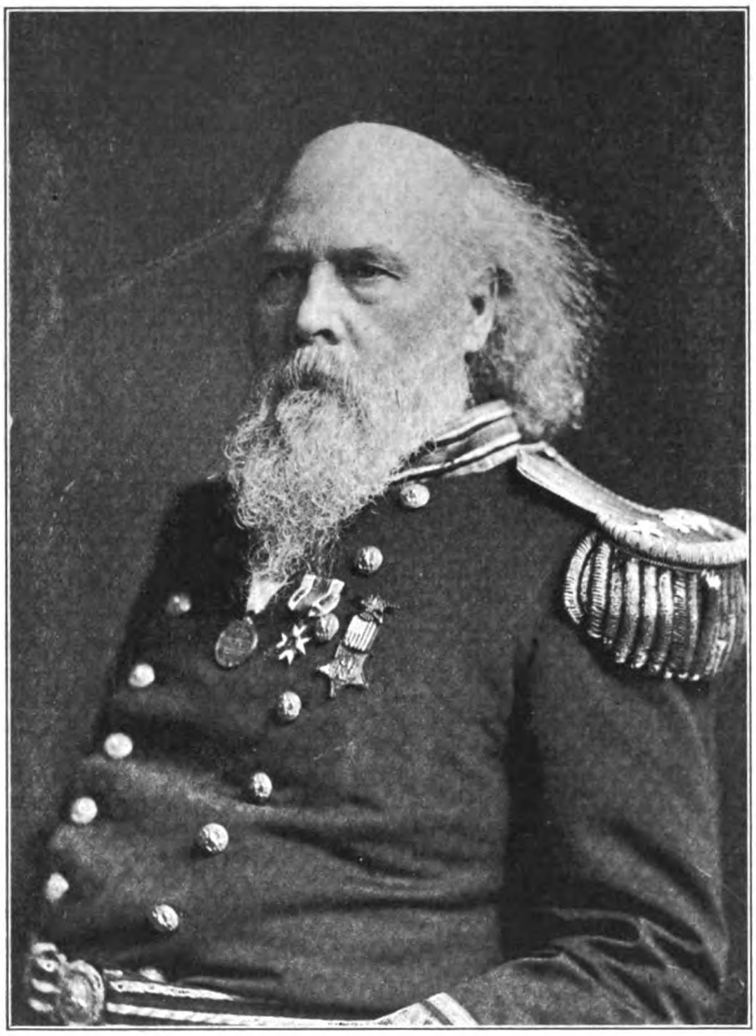
The associate members held meetings coincident with the parent body and re-elected their former officers with one exception, as follows: J. T. Corbett, president; Thomas Aldcorn, vice president; H. B. Hare, treasurer; F. B. Slocum, secretary; executive committee: W. O. Duntley, chairman, Chicago; W. H. S. Bateman, Philadelphia; D. J. Champion, Cleveland; T. P. Wallace, St. Louis, Mo.; J. W. Porch, New Orleans, La. The Supplymen's Association officers are the same as the foregoing.

The John E. Moore Co., of New York, has contracted with A. C. Brown & Sons, of Tottenville, Staten Island, for a wooden tug, 100 ft. long, to be completed Aug. 15. The John W. Sullivan Co. will furnish the engine, boiler, pumps, electric lighting outfit and searchlight. Steam steering gear of the Davidson-Bates type, furnished by the Staten Island Ship Building Co., will be used.

Death of Rear Admiral Melville

The Passing of a Distinguished Engineer and an Intrepid Explorer—A Man of Many Parts and Many Achievements

REAR Admiral George Wallace Melville, one of the most distinguished of American engineers, died at his home in Philadelphia on March 17 from paralysis. He was born in New York City on Jan. 10, 1841, and was descended from a distinguished Scotch family. He frequently expressed his request that he should have been the smallest physically of six brothers. They were all somewhat over 6 ft., while he, though a man of large frame, was a shade under 6 feet. He was educated at the Brooklyn Polytechnic Institute and later entered as an apprentice in the engineering works of James Burns in Brooklyn, where he received his practical training. He entered the navy at the outbreak of the civil war as third assistant engineer, serving on board the Michigan and Dakota and other vessels, taking part in several engagements, including the capture of Norfolk. Evidence of his fundamental courage was given in 1864 on board the Wachusett, which was lying in the port of Bahia, Brazil, near the confederate ship Florida. At a council it was proposed that the Wachusett should ram the Florida, but objection was made to it on the ground that the shock would loosen the boilers, break the steam pipes and scald everyone below. Melville met the objection by volunteering to stay below alone and take his chance. The Florida was captured, not, however, by being rammed, as owing to a cable jamming an ineffective blow was struck and Melville was put on board of her as chief engineer.



REAR ADMIRAL GEORGE WALLACE MELVILLE

It was in the Jeanette arctic expedition that Melville became an international figure. This expedition was equipped for the government with funds supplied by the *New York Herald*. The expedition was commanded by Lieut. DeLong, with Melville as chief engineer. On this expedition he proved himself a man of infinite resource. The Jeanette was not well suited for arctic exploration work and Melville's time was spent in inventing all sorts of mechanical appliances. For instance, she sprang a bad leak in the ice pack and as the conserving of the coal supply was an important item he succeeded in rigging up a pump and wind mill of his own contrivance. As is well known in arctic history the Jeanette after passing through Bering straits was caught in the ice pack, where she was held for nearly two years, drifting meanwhile 500 miles to the northwest. On June 11, 1881, she sank, the crew meanwhile putting over the small boats, which they were forced to pull over the ice until they came to open water. At the point where the Jeanette sank they were nearly 500 miles from the Siberian coast. When the party finally reached open water, DeLong distributed the crew among the small boats. He took command of one, Lieut. Chipp of another, and Melville of the third. Chipp's boat foundered in a storm and DeLong's and Melville's boats were separated. Melville was the first to reach land, finding succor among the Yakut Eskimos, but so badly were his feet frozen by this time that it was 15 days before he could stand upon them. However, as soon as he could reach a Russian outpost, he collected supplies to enable him to go in search of DeLong. In his retreat from the Jeanette he had already traversed over 2,000 miles, but without hesitation he began again a journey of 1,100 miles into the frozen wilderness alone in search of his commander. This exploit is without a parallel in arctic exploration. He lost the trail and was compelled to return only to resume it later with better equipment. He finally discovered the corpses of DeLong and his party and buried them. They were later disinterred and taken to Annapolis, where the timber cross, which Melville put over their remains, has been reproduced in granite.

Melville's experience upon this expedition led to his appointment as chief engineer of the Thetis, with Commander Schley (later rear admiral) in charge, which was sent to the relief of the Greely expedition. The remnant of this ill-starred expedition was found near Cape Sabine in Ellesmere land and for his services congress advanced Melville 15 numbers in rank. He was shortly thereafter detached as engineer-

in-chief of the navy, in which capacity he served for three consecutive terms, or 16 years altogether. His tenure of office was markedly one innovation after another, probably the most pronounced being the installation of triple screws in the cruiser Columbia, built in 1890. This departure created world-wide interest. She reduced the warship record for a trans-Atlantic passage by crossing the Atlantic ocean from Southampton to Sandy Hook in less than seven days.

Admiral Melville was a voluminous contributor to the Scientific press and lived an enormously busy life. His activities did not cease upon his retirement for age in 1903. With John H. Macalpine he formed the firm of Melville & Macalpine, with offices in Philadelphia, engaging in engineering practice. One of their most notable achievements was the development of a reduction gear for high speed turbines, a problem which they attacked successfully at the instigation of George H. Westinghouse.

Admiral Melville played many parts in his busy life and no American engineer has been more highly honored.

Hydraulic Riveting*

By H. J. Hartley, Philadelphia, Pa.†

Considerable diversity of opinion seems to exist upon the pressure per square inch of rivet section required for all classes of boiler work.

It is conducive to tight work to have a fillet under the head of the rivet, which will wedgelike jam into the slightly countersunk hole, thus insuring, at least without the necessity of caulking, a watertight rivet, provided the plates composing the joint have been properly fitted and the rivet holes made fair and of proper size for the rivets to be used. The allowance on increased sizes of rivet holes for heat expansion, over the sizes of the rivets to be driven, in first class high pressure boiler work, should not exceed the following fractional numerals, namely:

Advancing by 1/8 Inch

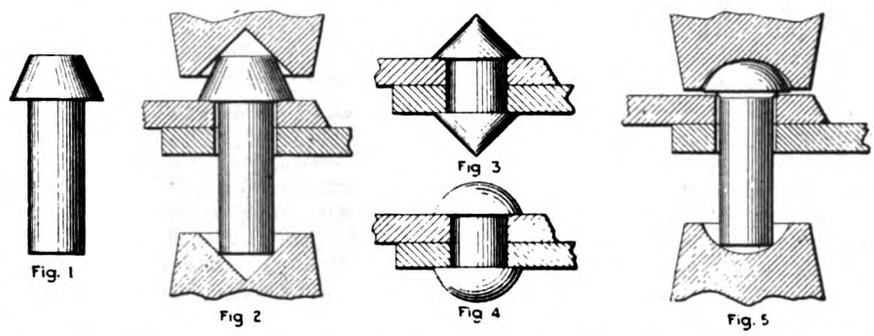
For a 3/4-in. diameter plus 1/32 in.
For a 7/8-in. diameter plus 3/64 in.
For a 1 -in. diameter plus 3/64 in.
For a 1 1/8-in. diameter plus 3/64 in.
For a 1 1/4-in. diameter plus 1/16 in.
For a 1 3/8-in. diameter plus 1/16 in.
For a 1 1/2-in. diameter plus 1/16 in.

and so on proportionately.

All rivets should be heated to a medium cherry red at the head, and, if possible, to a dark cherry red at the points.

In regard to the pressures required for driving rivets cold for tank and stack work, as frequently required, I would recall some experiments made by Wm. Sellers & Co., between the compression platforms of their Emery testing machine.

A number of 3/8-in. size rivets were



subject to pressures between 10,000 and 60,000 lbs. with the following results:

At 10,000 lbs. the rivet swelled and filled the hole;

At 20,000 lbs. the head was well formed;

At 30,000 lbs. the rivet was well upset and headed; and

At 40,000 lbs. the metal plates surrounding the rivets began to stretch and became more apparent as the pressure was increased to 60,000 lbs.

Pressure For Cold Rivets

From these experiments the conclusion might be drawn that the pressure required for driving and heading *cold* rivets is about 150 tons—300,000 lbs. per sq. in. of rivet section.

About the same time the test referred to, as made by Wm. Sellers & Co., a series of tests for determining the test pressures for driving rivets in high pressure steam boilers was also made at the Baldwin Locomotive Works by Mr. Vauclain, with the following results:

Six sets of 9/16-in. plates were selected and prepared for the tests, each set being composed of six plates, these being drilled for rivets varying in size by one-eighths, from 5/8 in. to 1 1/4 in. in diameter.

In the first set the 5/8-in. rivets were driven with a pressure of 25 tons; the second set, the 3/4-in. rivets, were driven with a pressure of 33 tons; in the third set, the 7/8-in. rivets were driven with a pressure of 50 tons; in the fourth set, the 1-in. rivets were driven with a pressure of 66 tons; in the fifth set, the 1 1/8-in. rivets were driven with a pressure of 75 tons; and in the sixth set, the 1 1/4-in. rivets were driven with a pressure of 100 tons.

Cutting Specimens in Half

The specimens were then cut in half, longitudinally, through the rivet, which showed that where a pressure of 33 tons had been applied the metal under and around the heads of the 5/8-in. rivets was indented or compressed. When 50 tons on both the 5/8-in. and 3/4-in. had been applied, the same effect was shown, and so on up to 100 tons pressure; all of which showed more or less indentations, excepting the 1 1/4-in. rivets.

In a second test, similarly conducted, the rivet holes were punched instead of drilled; the only difference in the result being that the plates showed no indentation and the holes were all filled. The conclusion was that the suitable static pressure for 5/8-in. rivets is 25 tons; for 3/4-in. rivets, 33 tons; for 7/8-in. rivets, 50 tons; for 1-in. rivets, 66 tons; for 1 1/8-in. rivets, 75 tons; and for 1 1/4-in. rivets, 100 tons.

Conclusions From Tests

The conclusions drawn from the foregoing tests, when converted into pressure per square inch of rivet section, would be in even pounds, approximately as follows:

Diameter of Rivets.	Pressure Per Sq In. in Lbs.
5/8 in.	163,000
3/4 in.	149,000
7/8 in.	166,200
1 in.	168,000
1 1/8 in.	151,200
1 1/4 in.	163,000

Average—160,000 lbs.

Example.—Static pressure, 25 tons = 50,000 lbs., divided by area of 5/8-in. rivet = 0.3680 = 162,952 lbs. pressure per square inch of rivet section.

The average of the above pressures per square inch of rivet section is 160,000 lbs., which may be used in calculating the necessary pressures for rivets of other sizes.

Therefore, it will be noticed that these figures are in a very convenient shape for practical use.

An experiment was also made in cold riveting, thus: A pair of plates were punched for 3/4-in. rivets, which were driven into the holes with the same range of pressure, but it was found that the lower pressures were not sufficient to form the head, whereas the higher ones indented the plates.

The writer has been working under the foregoing described conditions, with the same riveting plant, for about 20 years, doing all classes of steam boiler work varying in thickness of plate from 3/8 in. to 1 3/4 in. and in rivets

*American Boiler Manufacturers' Association, New Orleans, March 12-15.

†Cramp's ship yard, Philadelphia.

from ⅝ in. to 1½ in. in diameter, with perfect success.

There exists a condition, however, connected with hydraulic riveting that is especially favorable to rivet compression and the making of tight work, which is generally not known or realized, and is due to an increased pressure at the terminal stroke of the ram, over the initial stroke, amounting, by experiment to be, conditionally, as high as 60 per cent.

Pressure at Impact

In other words, a static pressure of 1,200 lbs. per square inch in an accumulator has shown on the gage at the end of the stroke a momentary impact of 2,000 lbs. per square inch. It will be understood that this increased terminal pressure is due to the surge of the accumulator, on its sudden arrest, at the end of the stroke, and at the time when the rivet has become cooled from contact with the water-cooled dies and plates.

Too much value cannot be given to this terminal pressure as a climax to perfection in hydraulic riveting; the effect being about the same as a second pressure on the rivet, after partially cooling, would be. This advantage is ever there and costs nothing to obtain.

Unlike the extra labor required on hand and pneumatic riveting to accomplish the same object—*tightness*—by having to partly drive a rivet and shift, in order to allow it to cool, to the next; partly drive it and then shift back to the first, finish it, then go again to the last left unfinished, and so on throughout.

Admitting Pressure to Ram

In order, however, to obtain the full value of the terminal pressure, it is necessary for the operator to exercise some skill in admitting the initial pressure to the ram. This is done by opening the valve slowly and sufficiently until the hot rivet has been well upset into the hole, after which the full pressure should be applied, which will have the effect of accelerating the descending momentum of the accumulator, thereby causing a suddenly increased pressure on the rivet at the moment of its impact and the rebound, due to cushioning on account of more or less air in the water. This is more apparent with accumulators having small areas of pistons.

The accompanying illustrations will show the shapes of the rivet-heads generally in use by most boiler manufacturers.

Fig. 1 shows the shape of rivet-head mostly used by manufacturers.

Fig. 2 shows rivet with pan-shaped head, ready to be driven with cone-shaped dies; the rivet being hot and the initial pressure bearing on the head and point, it necessarily follows that the rivet must flow into the dies before it gets bearing sufficient to squeeze it into the dies.

Fig. 3 represents the shape of the rivet-heads after being driven.

Fig. 4 represents rivet with round-shaped head, with fillet under head, heated and ready to be driven. It will be noticed that the dies on head and point bear more centrally, and while the die at the blank end of the rivet has a slight point bearing like Fig. 2, yet it is so little, due to the head end being solidly and firmly held in the die, that it may be said the initial pressure is bearing centrally on both ends of the rivet thus permitting the rivet to flow into the hole while filling the radial-shaped dies. In other words, the main feature is accomplished by the rivet filling the hole before the head is formed.

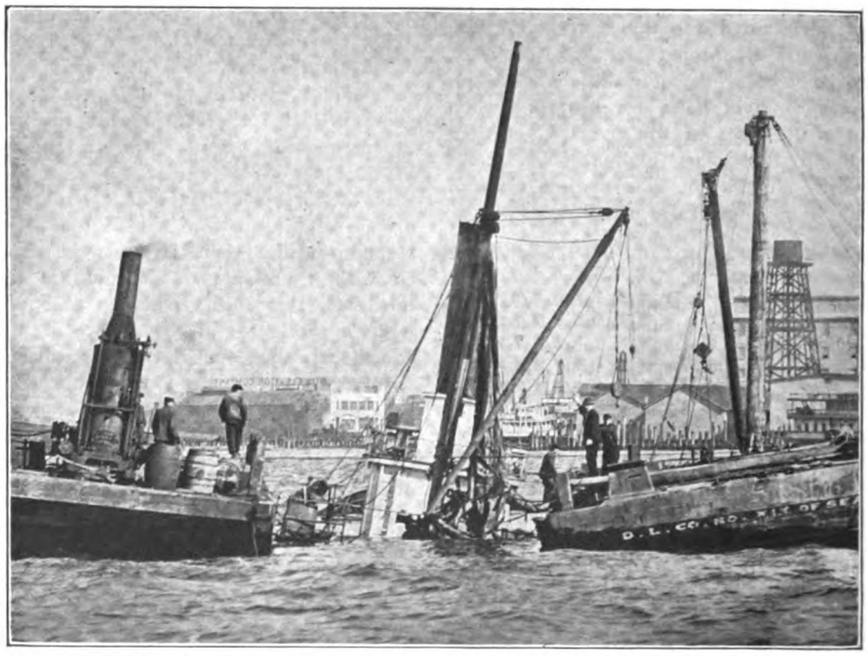
Fig. 5 represents rivet driven with round-shaped dies in comparison with Fig. 3—cone-shaped dies.

Fig. 6 shows the relative values of the two shaped heads, each having the same quantity of material. The round head will be seen to be the better and also stronger in the shearing section of the head. It is also much easier to caulk a round head than a cone head rivet, if such should ever be required. The first indentation of the caulking tool on a round head rivet forms an arch or backing to the tool, which has the effect of forcing the metal down to the plate, similar to caulking the edge of a seam, while the same operation on a pan and cone shaped head has a tendency to curl up the thin edges of the rivet on account of insufficient metal above the caulking surface.

Raising Steamer Independent

This photograph is a scene in Seattle harbor showing the method by which the fishing steamer Independent, 221 gross tons, was raised after she suddenly went to the bottom, Feb. 22, from causes unknown. While lying at the bunkers after taking on 170 tons of coal, part of it on deck, the vessel gave a sudden list to starboard and rapidly filled, sinking in about 35 ft. of water. Forty fishermen and sailors sleeping aboard barely escaped with their lives.

In sinking the Independent lay over on the pier, breaking one of her masts and damaging her upper works and sokestack. She lay on the bottom at an angle of 45 deg. to starboard. The underwriters first attached heavy tackle to the vessel, pulling her away from the pier into the slip. After this, scows were brought alongside on either side and divers passed strong 1½-inch cables under the keel and about the hull. By manipulating these cables, the vessel was partly righted and then with the aid of the tides the steamer was raised. With each succeeding low tide the ropes were drawn taut and at high tide the submerged derelict was hauled into shallower water. This was continued for four days until the hull was almost out of water, when convoyed by the two barges, as shown in the photograph, the Independent was beached across the harbor. At this time a strong wind arose and as the vessel lay on a lee shore it was necessary to cut the scows adrift and delay operations for several days until wind and waves abated.



RAISING THE FISHING STEAMER INDEPENDENT IN SEATTLE HARBOR

Olympic-Hawke Collision Case

The Theory of Suction is Evidently Regarded Abroad as a Bit of Naval Fiction—However, it is a Well Established Force

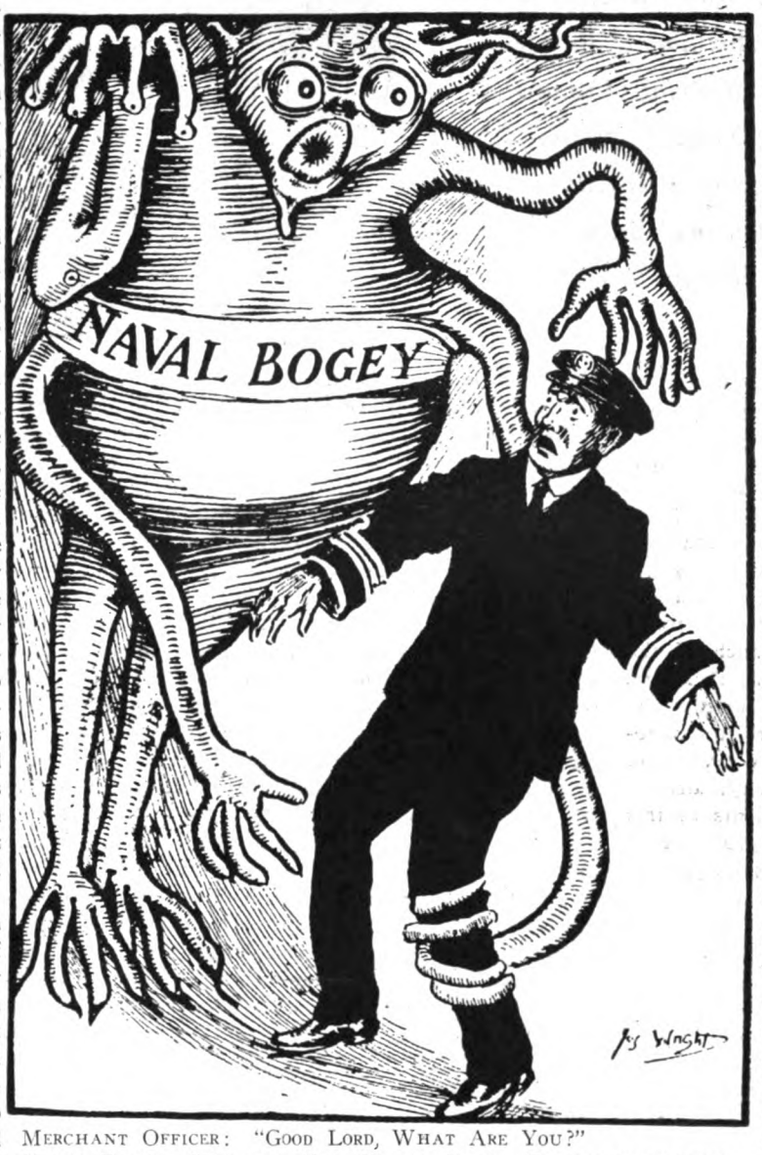
WIDESPREAD interest still obtains in the Olympic-Hawke collision and the result of the appeal from the decision of the admiralty court is eagerly awaited. Evidently the English papers cannot see that theory of suction at all, though the court paid much attention to it, and of course in this country we have long been familiar with it.

Herewith is reproduced a cartoon from a British maritime paper in which the merchant officer is made to regard the theory of suction as a naval invention. It is curious that in so old a maritime country as England is, this well known force should not have been hitherto recognized. The phenomenon is perfectly well understood in the United States, especially on the great lakes. Instances of collision due to suction are many, particularly in narrow channels and in shallow water—and both of these conditions must have been met with at the precise spot at which the Olympic and Hawke collided.

The effect of suction briefly is as follows: If one vessel is overtaking or passing another vessel in close proximity, the effect of the disturbance created in the water by the passage of the vessels is to produce a powerful lateral thrust upon the bow of the vessel which has been overtaken, tending to force the bow away from the passing ship. As the faster vessel moves ahead and about the time that the bow of the slower ship is abaft the center of the length of the faster vessel, the conditions are reversed and there is set up a powerful force tending to draw the bow of the slower vessel over towards the passing ship.

It was this latter condition which brought about the Olympic-Hawke collision. It was established in the evidence that the helm was thrown over to counteract the swinging-in of the bow, but that the latter force was so powerful as to render the helm entirely useless. The distance between the two ships when the Hawke began to swing over towards the Olympic was about 300 ft.

In rendering decision, however, the court ignored the evidence as to suction, rendering its decision purely on the question as to which ship had the right of way. The court ruled that since the Olympic had the Hawke on her starboard side, and therefore according to the rule of the road, should have kept out of the way of the Hawke, but failed to do so, the collision, from whatever physical causes it may have been due, was chargeable to that ship. The officers of the Olympic claim that the Olympic was ahead of the Hawke, that the Hawke was steaming faster than the Olympic, and that she was therefore, according to another rule of the road, an overtaking ship, and as such should have kept out of the way of the Olympic and, that having failed to do so, she was responsible for the disaster.

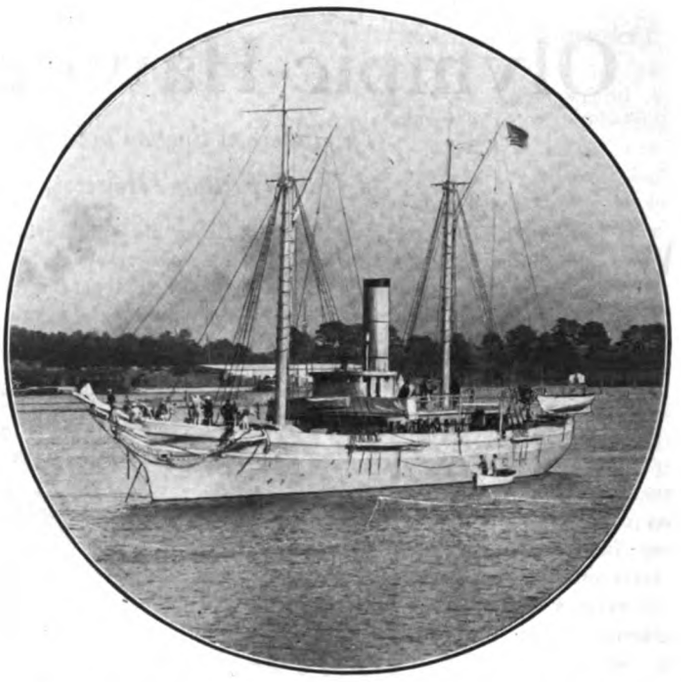


MERCHANT OFFICER: "GOOD LORD, WHAT ARE YOU?"
NAVAL BOGEY: "I'M THE NEW NAVAL BOGEY 'SUCTIONPUREANDSIMPLE.'"
MERCHANT OFFICER: "ANOTHER LOCAL TERROR?"
NAVAL BOGEY: "YES, MY LAD, SO MIND YOU DON'T GET SUCKED IN. I SINK SHIPS, AND DON'T YOU FORGET IT."

In the elimination and summing up of the evidence, it was clear that the court placed more credence upon the testimony of the officers of the Hawke than on the Olympic, apparently on the ground that naval officers had more accurately defined the exact location of the collision. Since then, however, the ram of the Hawke has been found by divers off Cowes. Its position is 1,200 ft. from where the Hawke was stated at the trial to have been at the time of collision, that is 1,200 ft. more to the eastward and a little more to the north of the channel. This would tend to corroborate the evidence given by the officers of the Olympic and furthermore would tend to show that the Hawke had ample room, and that the Olympic did not make a converging course for the buoy after entering the channel. As the ram weighs 20 tons, it could not have drifted far, if at all, and outside of naval circles the position of the ram is regarded as establishing beyond doubt the location of the cruiser at the time of the collision.

No maritime case in years has attracted such attention as this one. Its effect upon public safety will undoubtedly be excellent.

The Revenue Cutter Service



Some Facts About a Department of the Government Which an Efficiency Board Would Now Seek to Abolish—Some of the Things Which it Has Accomplished as an Auxiliary of the Merchant Marine — Enforcing Customs Laws, Regulating Shipping, Searching for and Destroying Derelicts —Its Important and Interesting History

IN the report of the Cleveland economy commission, recently transmitted to congress by President Taft, there appeared a recommendation that the revenue cutter service as at present constituted should be abolished and that in its stead there should be established a similar service within each department which should do those things that are now done for it by this most efficient branch of the treasury department. It is, therefore, not untimely to review briefly the history of this ever alert and altogether useful semi-military branch of our governmental machinery, also to see some of the achievements of this service which it is now proposed to segregate and in so far as its present organization is concerned to abolish.

At the conclusion of the Revolutionary war after the Continental navy had been disbanded we had no sea force available for the defense of our coast line, nor was there any means of protecting our small but constantly increasing maritime interests. Soon the need of just such a force became so apparent that the first congress passed a law creating the revenue cutter service. This was in 1790, eight years prior to the establishment of the navy. For convenience this newly created sea force was placed under the jurisdiction of the treasury department and there it has remained to this day. By November, 1791, ten cutters were ready for duty and from that time until a navy was organized these vessels constituted our only armed force afloat. The officers placed in command had seen service in the Continental navy, the first one to receive his commission from President Washington, being Capt. Hopley Yeaton of New Hampshire, who had been a lieutenant on the frigates Raleigh and Dean, during our struggle with England. Originally the work of this service consisted of patrolling the Atlantic coast and the enforcement of the few maritime laws which we then had. But in 1798 the president was ordered by congress to place this force at the disposal of the recently appointed secretary of the navy, who in that and the succeeding year made use of it in West Indian waters during our troubles with France. In that work the cutter Pickering captured ten prizes and the cutter Eagle five, a highly creditable record. By congressional action in 1799 the president was further authorized to cause these vessels to be employed in the defense of our coasts and in repelling hostilities toward vessels and commerce, as for instance piracy within its jurisdiction.

Service in Coast Defense

During the war of 1812 the vessels of this force were used as dispatch boats and for coast defenses, and again they acquitted themselves well. In fact the first capture made in that struggle was by the cutter Jefferson, which seized the schooner Patriot. Briefly told, a total of 14 British vessels with their officers and crews were taken by revenue cutters.

Probably the most notable contest during that war was waged by the cutter Surveyor and the frigate Narcissus, the former finally yielding to the overwhelming force of the latter. The daring crew of the Surveyor fought so desperately, however, that the commanding officer of the frigate returned his sword to Capt. Travers, with a letter bearing admiring testimony of the splendid struggle which he and the men under him had made against such great odds. For many years subsequent to 1815 many of the more efficient officers of the navy asked for and secured commissions in this survice. During that time few more responsible or difficult duties fell to the lot of the naval officers than those which were given to the commanders of the cutter of the British Provinces, during the fishery difficulties following the treaty of 1818. In the Seminole war in 1836 efficient and substantial aid was rendered by the cutters, Capt. Webb of the navy in his report to the department saying "their prompt and ready co-operation with the army has called forth the highest commendation for the commanding generals." Under a law passed in 1837, the president was required to assign cutters to service along the coast during the winter months for the relief of storm driven vessels, the vessels of the navy which had first been assigned to this work having proved unsatisfactory and so displaced by the older service. From that day to this thousands of lives and millions of dollars worth of property have been saved, as will appear later on. Again during the Mexican war, five cutters were engaged in the attacks upon Alvarado and Tabasco. Much work was also performed by them in the blockading of our opponent's coast.

In 1858, when a naval force was sent to Paraguay, the cutter Harriet Lane accompanied the expedition and Com-

modore Shubrich in his subsequent report to the secretary of the navy paid high tribute to the assistance rendered by Capt. John Fanner and the men under him. In fact the Lane was spoken of as one of the most efficient vessels of the expedition. During the Civil war this same vessel participated in the attacks upon Newport News and Hattaras Inlet, the Miami in that on Sewell's Point and the E. A. Stevens was with the ironclads under Rodgers at Fort Darling. Furthermore several other cutters performed efficient service in Chesapeake Bay with the Potomac flotilla and upon the James river with the blockaders. In fact the captain of the cutter Reliance, Thomas M. Dugan, lost his life in action off the Virginia coast. In the more recent Spanish war 13 cutters were engaged in active service, one of them, the McCulloch, coming in for particularly hearty commendation from Admiral Dewey, who in a report to the navy department spoke of it as a valuable auxiliary to his squadron. The Hudson also was in the engagement off Cardonas, Cuba, and so substantial was its aid to the torpedo-boat Winslow that congress awarded a gold medal to its commending officer Newcomb, also silver and bronze medals to the other officers and members of the crew.

In short, vessels of this service have taken part in every war which we have had and to such an extent have they become a part of our fighting force afloat that the secretary of the treasury in 1881, stated that the revenue cutter service, while charged by law with the performance of important civil duties, is essentially miliary in its character. By law it must cooperate with the navy, when the president so directs. This co-operation may take place, however, in times of peace as well as those of war. In the performance of its duties in times of peace it has been subjected to every danger that the regular naval force has to face and in much of its work, owing to the smallness of the vessels and the peculiar nature of its duties, its achievements have been truly marvelous. Let us see first what some of the civil duties with which it is charged by law are and then we will be the better prepared to consider the efforts of particular vessels in the discharge of such duties.

The law says that the service shall protect and enforce the customs laws and has the right of search of all merchant vessels arriving in this country or within four leagues thereof, if bound for one of our ports; that it shall suppress piracy; that it shall search for missing vessels or those in distress; that it shall enforce the neutrality laws by preventing armed expeditions from leaving our ports against countries friendly to us; that it shall protect the seal, bird and other reserves of this country against poachers; that it shall oversee the construction of life-saving stations and the drilling of their crews; that it shall protect property and see to the enforcement of the fishery laws in Alaskan waters; that it shall find and destroy dangers to navigation near our shores; that when required to do so, it shall see that the quarantine laws are enforced; that it shall supervise anchorages at specified ports; that it shall patrol the Great Lakes; that it shall protect the sponge fisheries off the Florida coast, and that it shall guard the public at international yacht races, regattas and like events.

Carrying Out Commissions

In addition to those duties particularly specified by law it shall be ever ready to carry out various unusual commissions which are the natural outgrowth of our expanding sphere of world influence and power. A few examples of the unspecified duties will suffice. In 1910 word came to the bureau of bird protection of the agricultural department that certain

THE REVENUE CUTTER BEAR IN THE ICE IN BEHRING SEA

poachers were landing on a particular island of the group of Sandwich Islands which had been designated as a bird reservation, the apparent purpose in their landing being to obtain the plumage of birds which frequented that island. Naturally Secretary Wilson was not to be expected to maintain a fleet in conjunction with the many other functions of the agricultural department. It was not feasible, nor had he thought to call upon our naval dreadnoughts to shoo away the intruders. Where then should he turn for help? Of course to the alert revenue cutter service which promptly despatched a boat to see to it that the birds were not further molested.

Acts as Floating Court

Again, a crime is committed in the Aleutian Islands and it is hardly reasonable to think that Attorney General Wickersham can keep a vessel in Alaskan waters for such a purpose, still, there is no resident judge on the islands and the criminal must be tried. so either the judge must go to the prisoner, or the prisoner must be brought to Valdez or Sitka for trial. Again the revenue cutter is pressed into service and what is locally called the floating court is soon in operation. The bureau of fisheries does maintain some railroad cars for the transportation of fish, but it has no facilities for keeping in touch with its branches in Alaska, so the good Sammaritan friend of all needy departments and bureaus comes to their aid.

Perchance the bureau of education wants to send supplies to its stations near Point Barrows on the Bering Sea, then a revenue cutter comes to its assistance. These are a few examples of the many duties which fall to the revenue cutter service to perform, which are not definitely and specifically named in the law. But little is heard of those performances, nor of those which come within the routine fixed by law. A few years ago when the Republic was in collision off New York and hundreds of lives were imperiled, the wireless message of Jack Binns went flying through the air. It was picked up among others by the navy department, which had no vessels to send, so the office of the revenue cutter service was hastily called up and appealed to for aid. Imagine the surprise of the naval official when he was told that four cutters were already on their way to aid the stricken steamer. Only a few weeks ago Gloucester fishermen were thrown into consternation by the report that some 50 herring boats were in great peril, having become frozen in the ice in Bonne Bay, Newfoundland. Almost instantly the Gresham, then in Boston harbor, and the Androscoggin off the Maine coast were on their way at top speed to help those small boats in distress.

Aiding Vessels in Distress

Late last month the Apache came into Baltimore for supplies after a perilous ten days spent in aiding twenty-three vessels in distress, whose valuation was over one million dollars. As soon as the needed supplies were abroad, she immediately put to sea and resumed her patrol of the dangerous coast line off the Virginia capes and Hatteras. On the first day of the present month a wireless message was received in Washington, telling of the crippled condition of the three-masted schooner Success off the Florida coast, with several lepers on board and the cutter Yamacrow, with several naval vessels was immediately sent in search of her, for fear that should the schooner go ashore, leprosy might be spread from her passengers.

To the Bear is given the duty of preceding merchant vessels to Nome, Alaska, as early in the spring as the ice will permit. She is required to examine the extent of the ice fields and to inform steamers by wireless the course which they should pursue in order to avoid the dangers incident thereto. This duty is extremely important, as commercial organizations are practically dependent upon the information furnished for the safety and protection of their ships. Then, too, this cutter annually makes a cruise through the Arctic Ocean to the northernmost point of Alaska. Her commanding officer is made a United States Commissioner to try petty criminals. The Thetis is regularly assigned to cruise in Hawaiian waters and in cases of bird protection, like the one spoken of above, it is this vessel which is called upon to aid. On Jan. 27, 1911, the Snohomish received a wireless call of distress from the American steamer Cottage City, which had gone ashore off Cape Hudge in British Columbia. She proceeded at full speed in a fog along that dangerous coast and arrived just in time to take off 81 passengers and crew and bring them safely into Seattle. The Forward, whose station is off Southern Florida, in October, 1910, took 552 passengers from the steamer Louisiana, which had been wrecked off Sombrero Light. Many of the passengers were women and children and all were conveyed to points of safety. I have spoken of these few dangerous trips which are purely incident to the regular routine of duties given this service in times of peace. Others as difficult could be told almost without limit. Eight cutters are constantly cruising in the stations of the Atlantic coast, north of Cape Hatteras, seven south of that point and in the Gulf of Mexico, three in the Great Lakes and eight on the various stations of the Pacific. There are also others detailed for harbor work, as for instance the Winnesimonet at Boston, for anchorage duty, as the Manhattan at New York, and as a practice ship attached to the revenue cutter school of instruction, of which the Itasca at New London is an example.

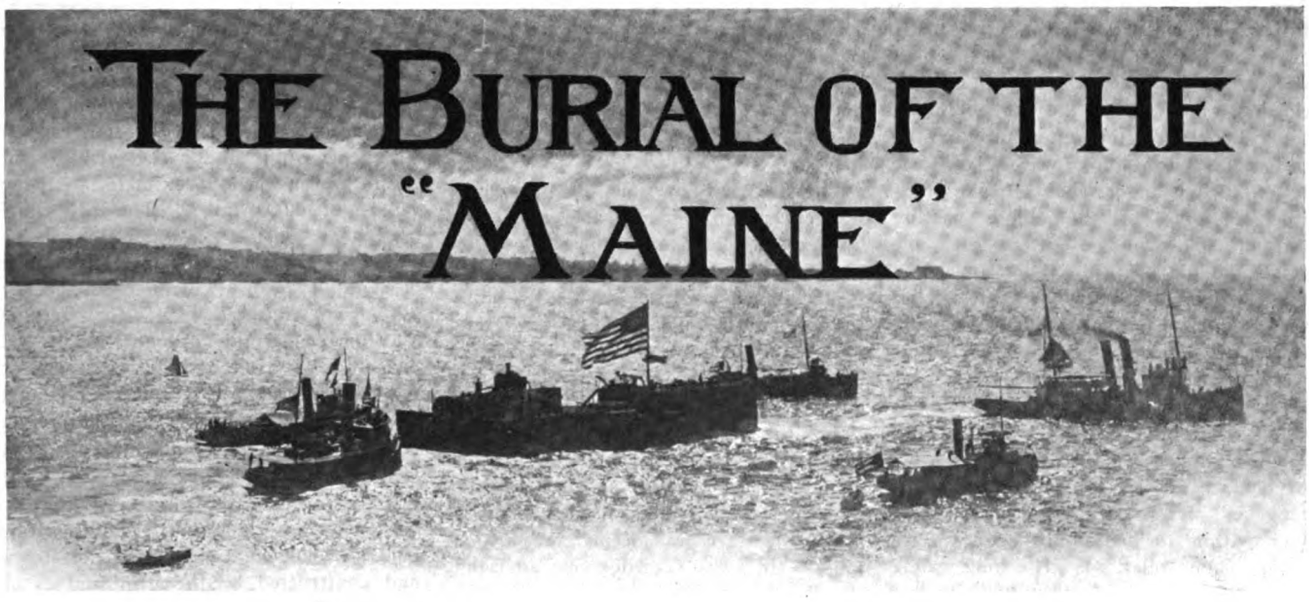
Saving of Lives

For the period from June 30, 1900, to Jan. 1, 1912, this service saved 583 lives; it boarded and examined the papers of 199,170 vessels, of which 4,264 were seized and reported for violations of law and were fined or penalized to the extent of $841,424; it aided vessels which with their cargoes were valued at over seventy-eight million dollars; it assisted over two thousand vessels in distress on board of which were 27,234 persons. It took on board its cutters and cared for 4,358 persons in distress, and it found and destroyed 126 derelicts dangerous to other vessels. Such is the revenue cutter service which has achieved so much in its various fields of usefulness covering operations along our extensive coast line. Many of their movements have been heroic in times of peace as well as war and any legislation looking to the curtailment of the efficiency of this service will be bitterly fought.

The San Francisco Bridge Co. has been awarded the first contract for a filling in the site of the Panama Pacific International Exposition, which will require the filling of 1,000,000 cubic yards of material at a cost of $200,000. The material is to be dredged from San Francisco bay, opposite the fair site and will be dumped back of a sea wall.

The old gunboat Bennington, which was purchased from the government by junk dealers for $20,000, two years ago, has left for Mexican waters, where she will be placed in commission by the Republic of Mexico. The purchasers of the vessel stripped the craft of all of the old iron and brass work and then received double her purchase price from Mexico.

THE BURIAL OF THE "MAINE"



THE BURIAL AT SUNSET

Photograph Underwood & Underwood, New York.

THE battleship Maine, which was blown up and sunk in Havana harbor on Feb. 15, 1898, with a loss of 260 lives, and which was lately floated at an expense of $900,000 to the American government, was towed out to sea on March 16, and "buried" with impressive ceremonies in 600 fathoms of water four miles from the coast of Cuba. Sailors from the cruisers North Carolina and Binghamton opened her seacocks and 100,000 persons on the waterfront saw her take her final plunge. Millions of flowers with which she had been adorned floated on the surface as she went down. The bodies of her victims were put aboard the North Carolina and taken to Arlington for burial. So careful was the search for the bodies conducted, that everyone aboard the Maine at the time of the explosion has now been accounted for.

The design adopted for raising the Maine was that of a dam elliptical in shape composed of cylinders 50 ft. in diameter, built of interlocking steel sheet piles, driven to a depth of 73 ft. with the cylinders placed tangent to each other, connected on the outer perimeters by short arcs of similar sheet piles, and with the cylinders and connecting sections filled with stiff clay from the harbor bottom near by and rock.

Contract was entered into on Oct. 27, 1910, with the Lackawanna Steel Co., of Buffalo, for the sheet piling, and the first piles were delivered at the wharf at Casa Blanca on Dec. 6. Driving began the same day, the process being in general as follows: An ordinary round pile was first driven accurately on the axis of a cylinder. Around this was assembled the circular form, fixed horizontally by the center pile; and floating in the water. A bottom piece of steel piling 50 ft. long was then placed against the form and allowed to penetrate into the mud by its weight. The top was usually about 4 ft. above the water surface. A bottom piece of 40-ft. length was then strung through the interlock of the first piece set and suspended on that piece until its 35-ft. top could be placed and bolted fast, when it was allowed to penetrate as far as its weight would admit. This was continued with bottoms of 50-ft. and 40-ft. length alternately. After a number of piles had been set the driving was be-

THOUSANDS OF PEOPLE AT HAVANA WATCHING THE BURIAL PROCESSION ON THE WAY OUT TO SEA. THE TUGS ARE PUSHING AND TOWING THE HULK OF THE MAINE

Photograph Underwood & Underwood, New York.

gun. The closure of the circle was made by the last 15 or 20 piles, which were set and then driven together. The closure was made in the perimeters of the cylinders on the outer face of the cofferdam. Two three-way piles were set in each cylinder, about 16 piles outside the line of the ellipse passing through the cylinder centers, and one at the middle of the exterior arc. The first two were for the short arcs joining the cylinders; the other for use should emergency require. After the cylinders were driven they were filled with clay from the harbor bottom, the soft matter being wasted and only the hard utilized.

The cylinders as driven were not all in contact at the theoretical points of tangency. To hold the fill in the sectors within the adjoining arcs one to three palm piles, 45 ft. long, were driven between each pair of cylinders at a point slightly nearer the interior of the cofferdam than the theoretical point of tangency. To increase the holding power, a rip-rap base was made inside and the pile tops were fastened to the adjacent cylinders with wire rope.

Process of Unwatering

When the cofferdam was completely filled, the process of unwatering began. The main deck of the Maine, as far as it remained in place, together with the captain's cabin in the superstructure, were exposed when the water reached 12 ft. The deck and floor of the cabin were found to be covered to a depth of from 3 ft. to 5 ft. with a deposit of mud. This was cleared away. The metal of the Maine exposed was found to be badly corroded. In a box on the after turret were found a quantity of web belts with bayonets in their scabbards attached and with cartridges in their pockets. Electrical action had apparently set in between the steel of the bayonets and the cartridge cases which had rotted the steel completely and deposited a portion of it in the form of an iron oxide on and around the cartridges, making of the belts, scabbards and cartridges a solid mass. Similarly an officer's sword had been eaten away completely at the junction of the blade and the hilt.

It was found that only the forward part of the vessel had been shattered by the explosion. The after part of the vessel from frame 54 aft, a length of about 122 ft., measured along the berth deck, was but little damaged. In fact, not even the electric light bulbs in this part of the ship were shattered by the explosion, the terrific force of which in the opposite direction had shattered tiles in the floors of houses on the Havana waterfront. Forward of frame 41 the Maine was entirely destroyed, for a distance of about 60 ft., nothing could be seen. Further forward was a twisted mass of steel out of line with the after portion of the wreck, and retaining no semblance to a ship.

Bulkheading the Stern

The forward portion of the wreck was cut up into manageable sizes with the oxy-acetylene torch and disposed of in deep water. The stern being practically intact, it was possible by building a wooden bulkhead between frames 42 and 43 to remove it by floating it. The bulkhead was finished recently, and when everything had been made watertight, the filling of the cofferdam by opening up the sluice gates in the steel cylinders was begun. As the wreckage had been lying in the harbor about 14 years, the stern was deeply imbedded in mud. It was considered advisable, therefore, not to depend entirely upon the buoyancy of the incoming water to loosen the wreckage from its resting place, and twenty-nine holes were accordingly bored into the bottom of the ship, fitted with flanges and pipe and connected to pumps, which forced water under considerable pressure down through these holes and underneath the ship. This water succeeded in loosening the vessel from the grip of the mud and clay in which it rested. Water from the harbor was admitted into the cofferdam very slowly until the Maine rose on a fairly even keel: then the rate of filling was increased until the battleship reached the normal level of the harbor like a boat passing through a canal lock. The ship was securely moored on either side to prevent her from swinging in against the sides of the cylinders and doing damage. Two of the twenty clay-filled cylinders were then removed to form an open waterway for the passage of the hulk out of the cofferdam and then, as stated, under escort of the cruisers North Carolina and Birmingham, she was towed out to sea by the naval tug Osceola, assisted by two local tugs, and buried, thus ending an unhappy incident which led to a war between two peoples.

Two Whaling Steamers

J. F. Duthie & Co., Seattle, Wash., started their ship building plant late in 1911 and took over the old Fulton Machine Works and erected their ship building plant at East Waterway close to the Chicago, Milwaukee & Puget Sound railway docks. The company is now building two steel whaling steamers and one steel steam halibut fishing boat. The contract for the two whaling steamers was secured in November, 1911, and the boats will be delivered in April to the Alaska Whaling Co., with headquarters at Minneapolis, Minn.

The whaling steamers are both identical in construction and of the following dimensions: Over all, 105 ft.; beam, 19 ft. 6 in.; depth, 11 ft. 10 in.

The hull is of steel throughout and built according to Lloyds requirements. The boats carry oil for fuel of sufficient quantity for an approximate steaming radius of 3,000 miles. The propelling machinery consists of a triple-expansion engine of the Marshall gear type. Steam is supplied by a Scotch marine boiler with two furnaces fitted for burning oil under natural draught. The oil burners are of the Dahls system for mechanical atomization of the fuel oil.

The steamer is equipped for hunting whale in the Alaskan waters and is equipped with the most modern type of gun and winches for this class of work. The gun was imported from Norway, but the whale hunting winch is designed and constructed by the firm and is of a special type.

Both frames and bed plates are of pressed steel plates. The boats are fitted with steam steering gear and carry one life boat and one pram. The boat is fitted with two staterooms forward and space for the fishing crew and also two staterooms and saloon aft; galley and mess room are located about amidship, pilot bridge and chart house directly above.

The designed speed of the boats is 12 miles per hour.

The steel steam halibut fishing boat is building for the San Juan Fish & Packing Co. and is of the following dimensions: Length over all, 141 ft.; beam, 25 ft. 6 in.; depth, 13 ft. She is of the awning deck type with a raised quarter deck, carries 12 dories and is equipped with wireless. One winch aft and one winch forward are installed to take care of the dories and cargo. The fish hold is located forward. The machinery is all aft. The crew's quarters forward between decks; galley, mess room and engineer's quarters aft between decks; deck crew's quarters below main deck aft; captain's cabin, mates' and wireless operators' cabin on awning deck.

The vessel is equipped with steam windlass and steam steering gear. The rudder is of the semi-balanced type. The propelling machinery consists of a triple-expansion marine engine of about 650 h. p. Feed, bilge, air and circulating pumps are all attached to the main engine. Steam is supplied by a Scotch marine boiler, 13 ft. diameter by 11 ft. 6 in. long, and built to pass the United States inspection for a working steam pressure of 180 lbs. per square inch. There is fitted 5-kw. generating set of the turbine type. The engine room is also equipped with a donkey pump and a double acting piston pattern air pump takes care of all the steam when the vessel is in port.

Personal Mention

Capt. Charles L. Hutchinson, of Hutchinson & Co., Cleveland, has returned from a southern trip.

John T. Franham, assistant inspector of boilers, at Detroit, has been transferred to Milwaukee.

Capt. W. C. Richardson, of Cleveland, has returned from a trip to Florida.

James French, Lloyds surveyor with headquarters at Cleveland, has returned from a visit to Scotland.

John Craig, vessel owner of Toledo, has just returned from a visit to the Pacific coast.

J. S. Ashley, of the firm of M. A. Hanna & Co., of Cleveland, has just returned from the south.

Daniel E. Ford, superintendent of the marine equipment of the Standard Oil Co., was in Cleveland on construction work recently.

E. E. Palen has been appointed assistant general manager of the Old Dominion Line, with headquarters at Norfolk, Va.

L. W. Sullivan, vessel agent at Toledo, has removed his offices from 318 Chamber of Commerce to room 3 White Star Line building.

Charles O. Jenkins has been appointed manager of the Jenkins Steamship Co., with offices in the Rockefeller building, Cleveland.

C. D. Dyer, of the Shenango Steamship Co., of Pittsburgh, was in Cleveland in relation to the business of the fleet recently.

Capt. A. F. Pillsbury, surveyor for the San Francisco board of underwriters, has resigned to engage in business as a marine surveyor.

David H. Watkins has been appointed general passenger agent of the Peoples and Citizens Line with headquarters in New York City.

Fred B. Dalzell, president of the Dalzell Towing Line, has been elected vice president of the Patchogue & Water Island Navigation Co.

Wallace Tomey, of Cleveland, has been appointed inspector of boilers of the steamboat inspection service at Evansville, Ind.

Philip D. Sloan, of Seattle, Wash., has just concluded a tour of the lakes interesting capital in the construction of a new floating dry dock at Seattle.

William F. Riley has been appointed superintendent of the Shenango Steamship Co.'s fleet of vessels with offices in the Rockefeller building, Cleveland.

Sven Anderson has been appointed chief engineer of the Maryland Steel Co., Sparrows Point, Md. He was for ten years superintendent of its dock department.

Albert E. Guy, chief engineer of the DeLaval Steam Turbine Co., Trenton, N. J., has resigned to accept a similar position with the Wilson-Snyder Centrifugal Pump Co., of Pittsburgh, Pa.

Frank W. Hibbs, Pacific coast manager of the Electric Boat Co., has been compelled to take a long vacation, owing to ill health. He is at present at Miami, Fla.

John F. Wallace, former engineer-in-chief of the Panama canal, says that England and not the United States will be the chief beneficiary in the completion of the canal.

A. L. Hopkins has been elected vice president of the Newport News Ship Building & Dry Dock Co., Newport News, Va. H. L. Ferguson continues as general manager.

Col. Thomas L. Casey, corps of engineers, U. S. A., has been placed on the retired list on his own application, after 32 years of active service. He is well known both on the lakes and on the coast.

Capt. Albert Gleaves, commandant of the naval station at Newport, R. I., has been selected by the navy department to succeed Rear Admiral Eugene H. C. Leutze, retired, as commandant of the New York navy yard.

George H. Collins, managing director of the Canadian Fish & Cold Storage Co., Prince Rupert, B. C., has gone to England to invite tenders for 16 fishing vessels for use in Pacific waters.

F. A. Ballin, Seattle, Wash., is preparing plans for the construction of two steel steamers for the Inland Navigation Co., of Seattle, for service on Puget Sound, one for passenger service and the other freight.

Harry R. Rodgers, general freight agent of the Cleveland & Buffalo Transit Co., has been promoted to traffic manager in charge of freight and passenger traffic with headquarters at Cleveland.

J. I. Heffernan, president of the Heffernan Dry Dock Co., of Seattle, has just returned from a trip to Panama. He predicts that the canal will stimulate immigration from Europe and that the Pacific coast will be greatly benefited.

Col. George W. Goethals, of the Isthmian canal commission, is now in Europe inspecting the Kiel canal and other related engineering works. While in Berlin, on March 10, he was the guest of Emperor William at luncheon.

Capt. Obed F. Bolles, one of the oldest marine officials of San Francisco, retired on March 17, after a long service in the United States steamboat inspection service. James G. Guthrie, formerly assistant inspector, succeeds him.

G. A. Tomlinson, vessel owner of Duluth, visited Cleveland on a business trip this week. He has decided to operate his fleet without insurance this year. He reports ice conditions as abnormal and says that an early opening of navigation is impossible.

Capt. W. E. Reynolds, superintendent of construction and repair of the revenue cutter service has been ordered from Washington to San Francisco to assume command of the South Pacific division of the United States revenue cutter service.

M. Philippe Buana-Varilla, the distinguished French engineer, a recognized authority on the Panama canal, scouts the suggestion of the existence of a volcano in that locality. If smoke and steam have really been seen to issue from the Culebra cutting he says the phenomenon can easily be explained by the nature of the different strata.

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Regulation of Lake Trade

Doubt has been expressed as to the jurisdiction of the Interstate Commerce Commission over lake traffic, especially in relation to the movement of iron ore.

An interpretation of the law and the authority of the commission from a member of the commission is therefore of extreme importance and has been obtained as follows:

"Where water lines are engaged in interstate traffic and the freight is not transported partly by rail, the commission has no authority over the water line and the interstate law does not apply to the water line.

"If, however, the freight is hauled partly by water and partly by rail, the commission has jurisdiction and can fix the rate and fix the portion that each transportation company receives.

"With regard to the dock charges, the position of the commission is this: The docking service is performed by the railroad. Where a water line has filed rates and agreed to through billing, the entire rate (including the docking charge) is one that can be fixed by the commission and the proportion allowed for dock service can be determined by the commission."

Panama Tolls

We share the views of the minority of the committee on interstate and foreign commerce. We believe that the United States has the right to relieve American ships engaged in the coastwise trade from the payment of toll charges through the Panama canal. The practice of levying tolls would be entirely new in American history. Exclusive of the Panama canal, this country has appropriated $627,098,236 for the improvement of rivers and harbors and the construction of canals, but it has not yet erected a toll gate in the path of our domestic commerce. We protest against the abandonment of the policy of free commercial intercourse between the states.

The right to favor our own shipping in the matter of canal tolls cannot be seriously questioned. President Taft clearly stated the case in his message to congress on the subject, saying:

I am confident that the United States has the power to relieve from the payment of tolls any part of our shipping that congress deems wise. We own the canal. It was our money that built it. We have the right to charge tolls for its use. These tolls must be the same to everyone, but when we are dealing with our own ships, the practice of many governments of subsidizing their own vessels is so well established in general that a subsidy equal to the tolls as equivalent remission of tolls, cannot be held to be a discrimination in the use of the canal. The practice in the Suez canal makes this clear.

The secretary of war has also maintained that there is no doubt whatever as to the right of the United States, both legally and morally, paying the tolls on its vessels. This is a perfectly recognized practice in respect to the tolls of the Suez canal, and in fact, one nation, Spain, has already taken steps to provide for the payment out of her treasury of the Panama tolls on one of the Spanish lines which will use the canal. There is no question that we have a perfect right under the Hay-Pauncefote treaty to favor our domestic shipping. If we have the right to collect tolls at the canal and repay them, we certainly have the right to remit them in the first instance. What is the use of resorting to any subterfuge to do indirectly that which we have the right to do directly?

Foreign Steamship Trust

The administration has finally joined in the movement that was started in congress several months ago by Representative Humphrey to prevent ships identified with any foreign combination operating in violation to the Sherman anti-trust law from landing at American ports. A measure to this end was introduced by Representative Humphrey in the House early in the session, but it has since undergone revision by Attorney General Wickersham at the suggestion of Mr. Humphrey. The bill as now drafted has the backing of the administration.

The bill is directly aimed at the foreign shipping interests which persistently violate the Sherman law and the commerce acts through pools and through agreements with the railroads. If passed, its effect will be to force a dissolution of the present arrangements between the foreign shipping pools and many of the trans-continental railroads in the United States. The bill is designed to give the United States government a means of enforcing the Sherman law in cases of foreign combinations and pools which are at present difficult to reach because there is no way of enforcing penalties. The proposed legislation will hit the steamship companies which are defendant parties in the suit brought by the government charging them with an unlawful combination and conspiracy in restraint of trade and commerce in the carriage of steerage passengers under the agreement among the members of the Atlantic conference.

The provisions of the bill are drastic, authorizing the sale of the vessel adjudged to have violated the Sherman anti-trust law and prohibiting it from entering at or clearing from any port of the United States under penalty of $25,000 for each violation. Pending a determination of liability, the vessel is not to be granted clearance papers except upon a deposit of a bond in double the amount of the penalty. The bill also authorizes the Postmaster General to cancel any contracts made with steamship companies that are found to be violating the law.

The indications are that the revised bill will soon be reported by the Committee on Merchant Marine and Fisheries and passed.

* * *

The Metal Schedule

A very frank and straightforward statement is the report of the Senate Finance Committee on the metal schedule of the Underwood bill. The measure is a most preposterous one and it is inconceivable that it should have been seriously presented for passage. The Ways and Means Committee of the House apparently gave little thought to the measure. It held no hearings and made no effort to discover whether any necessity existed for the revision of the existing schedule. Yet it recommended it for passage.

Vastly different was the attitude of the Senate Finance Committee toward the measure. It went into the most painstaking inquiry. It devoted all of its time for weeks to a consideration of the measure. It listened to the arguments of the representatives of 245 different industrial concerns and made earnest inquiry of each one of them. It discovered most conclusively that no need exists for the revision of the Payne bill, but on the other hand came to the conclusion that a general revision of the metal schedule would be dangerous. The industries affected are among the most important in the United States, and such a drastic revision as is proposed in the Underwood bill would create widespread disaster. The industries could not live under it. The committee submits that the enactment of this bill would be inconsiderate and most unfortunate legislation. It would reduce the measure of protection below the margin of safety, and would throw the domestic market wide open to foreign iron and steel products. Moreover, no report on the metal schedule has been made by the tariff board, which was created by the president under authority given by congress in the tariff act of 1909 for the express purpose of obtaining such facts with respect to any particular industry as would enable congress to proceed with intelligence in enacting legislation, levying duties on the products of industry. Constant or frequent revision of tariff rates, whether upward or downward, cause business disquietude and stagnation and manufacturers, merchants and traders were led to believe by the creation of the tariff board for the express purpose of careful and exhaustive inquiry into industrial conditions as a precedent to tariff legislation, that there would be no precipitous, haphazard revision of existing schedules.

Fortunately there is no likelihood of the Underwood bill becoming law.

* * *

The Year's Shipbuilding

During the fiscal year ended June 30, 1,527 vessels of 302,391 gross tons were built in the United States and officially numbered by the bureau of navigation, compared with 1,502 vessels of 347,025 gross tons for the fiscal year ended June 30, 1910. The decrease is due to a falling off of 65,000 tons in shipbuilding on the Great Lakes. The largest vessel built on the lakes was the bulk freighter William P. Palmer, of 7,602 gross tons. On the seaboard, the Honolulan, of 7,059 gross tons, was the largest steamer built under the coastwise laws for Tehuantepec railroad trade. No vessels were built exclusively for foreign trade, and no square rigged vessels.

The year's construction comprised 1,123 steam and motor vessels of 246,540 tons, 85 sail vessels of 11,398 tons, and 319 unrigged barges and canal boats of 44,453 tons.

Fitted Up As Oil Burners

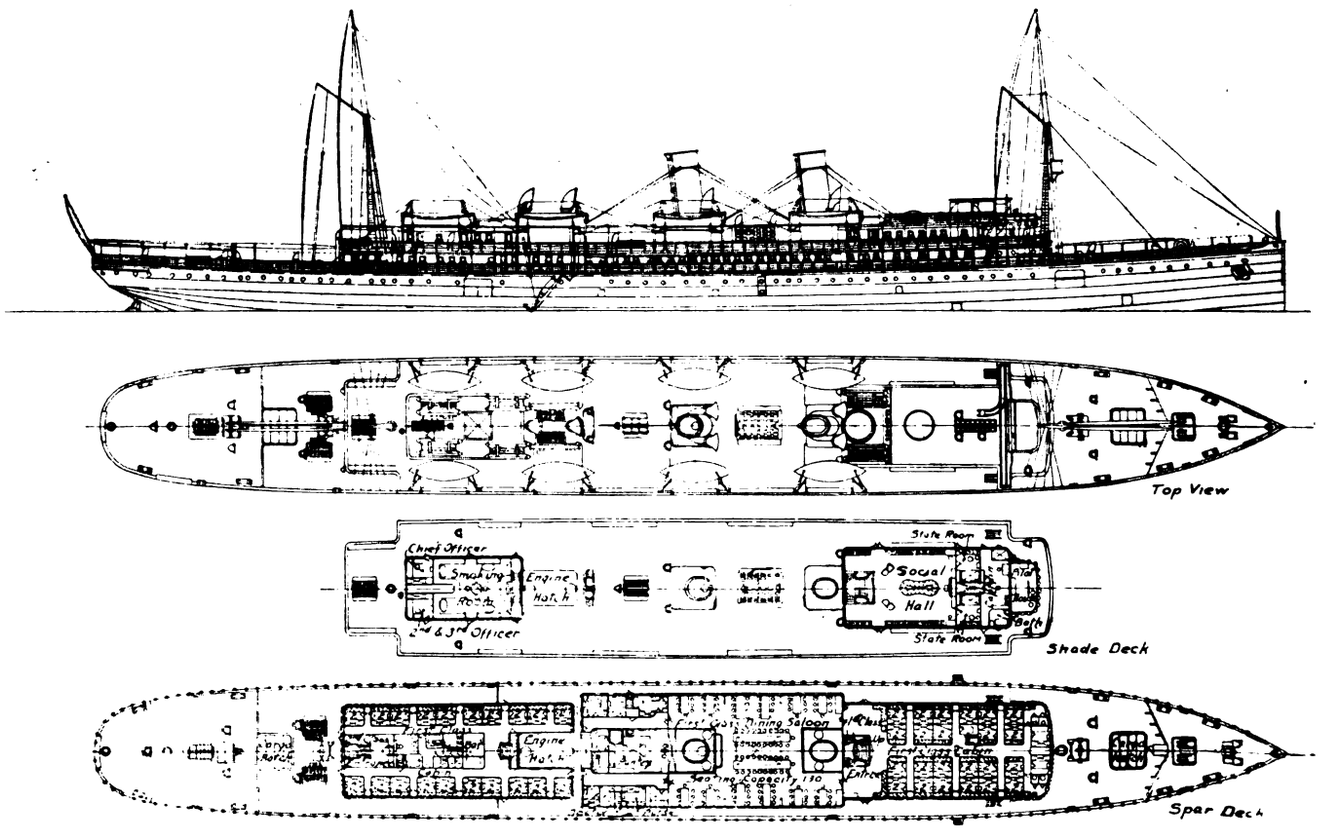
The Three Cramp-Built Steamers Sierra, Sonoma and Ventura Are Now Being Converted Into Oil Burning Steamers at the Union Iron Works

THE Union Iron Works, San Francisco, some time ago fitted up the steamship Sierra, of the Oceanic Steamship Co.'s fleet, with full tanks and oil burning apparatus especially for the Honolulan trade, and she has been operating successfully as an oil burner since. The company has now concluded to equip the Sonoma and Sierra as oil burners with sufficient oil-carrying capacity to make the round trip from Honolulu to Sydney. The fuel consumed between San Francisco and Honolulu would be replenished at the latter port. The total tank capacity as per contract is to be not less than 17,000 barrels. The alterations are being made at the Union Iron Works. The drawings herewith show the vessels as they were before alteration, and how they will be approximately after the alterations are completed. Briefly, the following repairs are contemplated: Removing engine and boilers; renewing double bottom under boilers and rebuilding engine seatings; fitting new bed plates for both engines in each steamer; thoroughly overhauling the entire machinery, including main engines, boilers and auxiliaries. The arrangement of boilers is also being changed so that the fire room will come immediately forward of the engine room with one fore and aft fire room instead of the arrangement as shown on the first set of prints. This change has been made to facilitate fitting a single smoke stack and to economize space to permit the installation of oil tanks immediately forward of 17,000 barrels capacity.

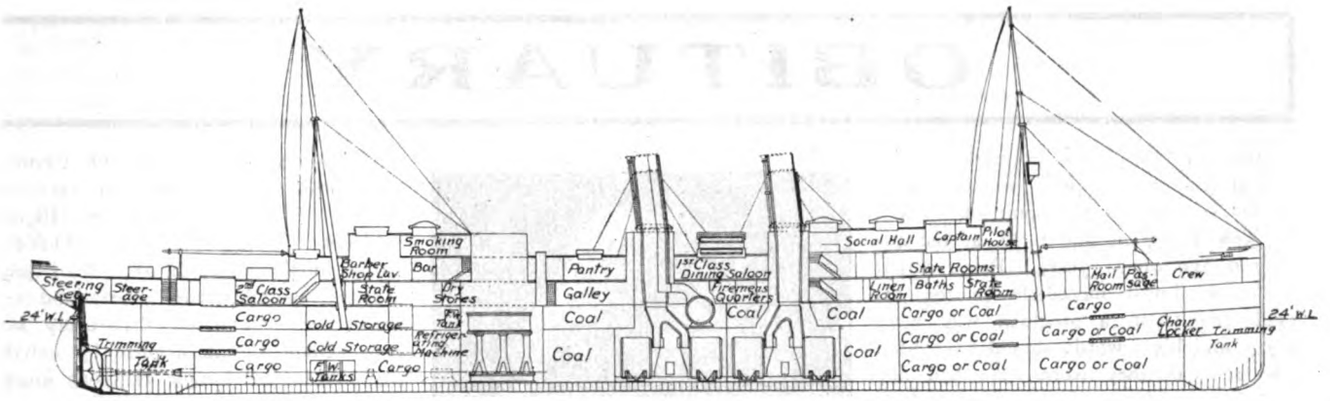
The changes involve numerous small alterations in the immediate vicinity of the smoke stacks and boiler casings, affecting the galley, pantry and lavatories amidships. There is also considerable work going on which is not clearly shown in the plans, consisting of a house on the after deck and extending the boat deck. The vessels are also being scaled and painted throughout and all the joiner work and upholstering is being gone over.

The Dahl mechanical oil-burning system, which is controlled by the Union Iron Works, is being installed. This system, although only a little over six months old, has been installed on about 40 vessels and also on a great many land boilers. The system is practically adapted for ocean-going steamers where water is an important item, as the atomizing is done without the aid of steam or air, which on a long voyage is an important item.

These steamers were built at Cramps, Philadelphia, in 1900, and are of the following dimensions: Length over all, 416 ft.; length between perpendiculars, 400 ft.; beam, molded, 50 ft.; depth, molded to main deck, 28 ft. 3 in.; depth, molded to spar deck, 36 ft. 6 in. Their displacement loaded on 24 ft. draught was 9,680 tons with deadweight carrying capacity on that draught of 5,230 tons, distributed as follows: Fuel coal, 2,030 tons; feed water, 120 tons; drinking water, 45 tons; stores, 60 tons; crew's effects, 17 tons; passengers and effects, 50 tons; cargo, 2,908 tons. The engines are triple-expansion with cylin-



OUTBOARD PROFILE AND DECK PLANS OF THE SIERRA AND SONOMA AS ORIGINALLY BUILT



INBOARD PROFILE OF THE SIERRA AND SONOMA AS ORIGINALLY DESIGNED

ders 28.46 and 76 in. diameter by 48 in. stroke, supplied with steam from eight single-ended Scotch boilers 13 ft. 6 in. diameter and 10 ft. 5 in. long, having a total heating surface of 14,975 sq. ft. and a total grate surface of 409.5 sq. ft.

The steamers were designed for a sea speed of 16 knots and have accommodations for 158 first-class passengers, 72 second-class and 88 steerage.

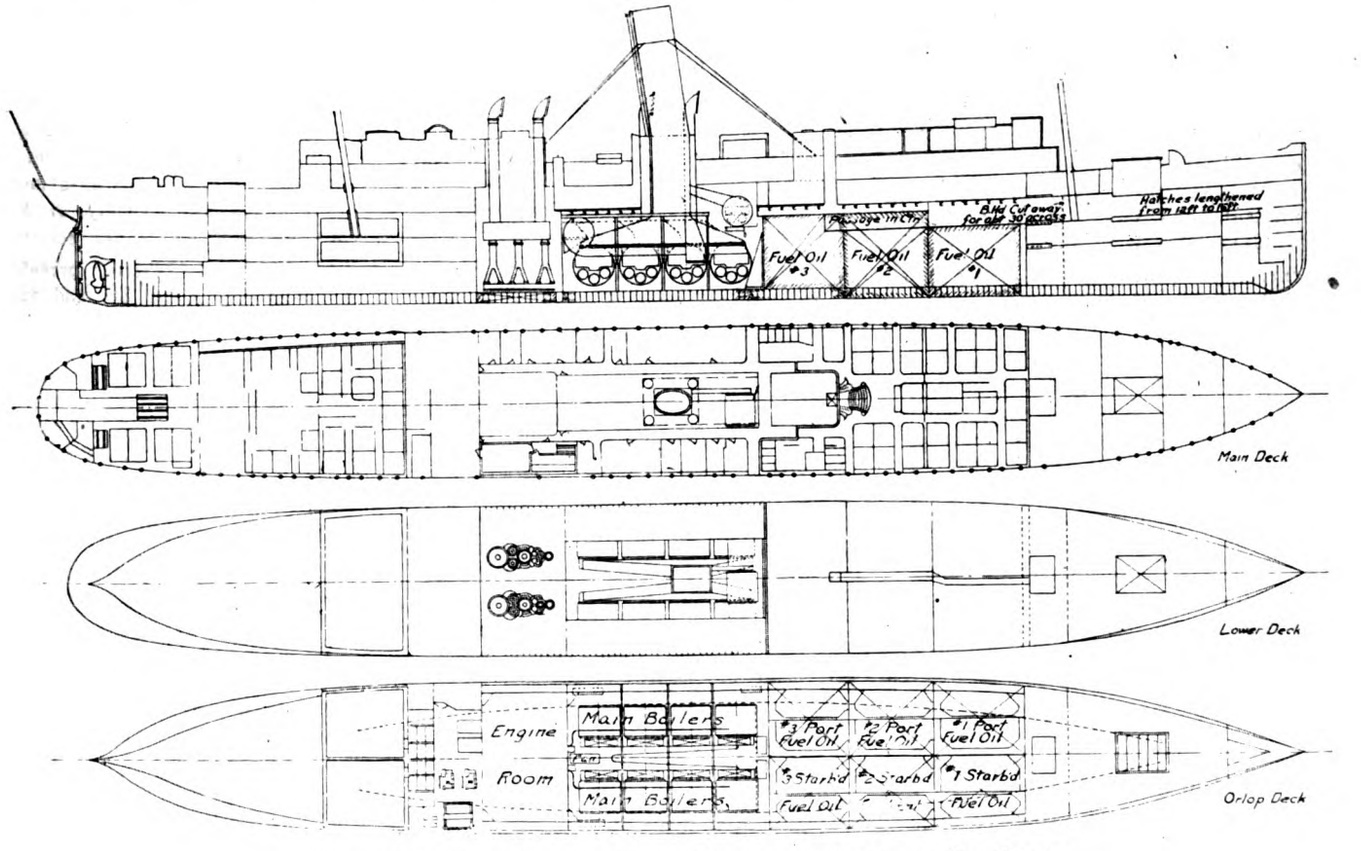
Benefit Association

The licensed officers of the Pittsburgh Steamship Co. are planning a mutual benefit association to include in its membership captains, mates, engineers and the shore forces of the company for the purpose of providing death benefits. The general plan contemplates an admission fee of $5 and an assessment of $2 per capita upon the death of a member. The death benefit will be $1,000. The counsel for the association has drafted a plan and the Pittsburgh Steamship Co. will handle the business of the association without charge.

The new supply store at Conneaut for the Pittsburgh Steamship Co.'s fleet will be ready for business at the opening of navigation. The new building, which is built upon a concrete dock, is three stories in height and is of brick and structural steel construction. It is absolutely fireproof, all stairways being concrete over an iron foundation. An ice-making plant capable of producing 40 tons daily is located in the basement.

The steamers St. Clair, Ontario and Champlain, of the Northern Lakes Steamship Co., will be managed by Gus. Von den Steinen, president of the company. They were managed by Joseph H. Speddy last year.

The Great Lakes Dredge & Dock Co. removed to the new Monroe building, Michigan avenue and Monroe street, on April 1.



PROPOSED GENERAL ARRANGEMENT OF MACHINERY SPACE AND OIL TANKS

OBITUARY

One of the most remarkable of Americans passed away when Charles T. Harvey died at the home of his son in New York, on March 13, at the advanced age of 83 years. Being gifted with an almost incredible energy, his achievements in a practical way were many and his rewards should have been greater than they were. He had one of those real practical natures which seemed to accomplish wonders without schooling. He was born in 1829, and his first employment was with E. & T. Fairbanks & Co., scale manufacturers of St. Johnsbury, Vt., as general western agent in charge of establishing agencies for their weighing machines in the larger western cities. While engaged in this pursuit he was stricken with typhoid fever, and upon his convalescence his employers sent him to the upper peninsula of Michigan to recuperate. This was in 1852, and congress had just authorized a grant of 750,000 acres of land to be selected in the upper and lower peninsulas of Michigan by anyone who would build a canal around the rapids of St. Mary's river at the Sault and commercially connect Lake Superior with the lower lakes.

His mind was intensely practical and he saw at once the possibilities of wealth lying latent in the situation, as both copper and iron ore in large quantities had already been discovered in the Lake Superior country. It was characteristic of Harvey's nature that when he became enthusiastic over anything his enthusiasm knew no bounds, and, as it was linked with an almost volcanic energy there was no such thing as resisting him. He talked his employers into organizing a company to build a canal, and, though he had no training whatever as an engineer, he had sufficient confidence in his own practical resources to undertake the supervision of its construction personally. The work was prosecuted under difficulties that were almost insuperable. There was no settlement nearer than Detroit. The nearest machine shop was hundreds of miles away, and the place was a veritable wilderness. The days were short and the nights long, but despite all handicaps, including a frightful decimation of labor by the cholera, the canal was finished in two years' time. As soon as it was accepted, Harvey selected the lands in payment for his employers, one of the locations bearing the celebrated Calumet and Hecla mine. He then undertook the manufacture of pig iron in the peninsula, but, like all

CHARLES T. HARVEY

the others who attempted it at the time, he lost money.

In the 60's he went to New York and planned the elevated railway there, which was the first to be constructed anywhere in the world. He was a man who thought in large units and devoted his life to large affairs. In fact, upon the approach of his eightieth birthday he was actively engaged in interesting capital in a railway to reach the Hudson Bay country. He was a man of very deep convictions and of an intensely religious nature. He established a Presbyterian church at the Sault, which was one of the first, if not the first, in the north, and he preached and practiced total abstinence during his entire life.

Frank J. Firth, former president of the Erie & Western Transportation Co. (Anchor Line), the lake end of the Pennsylvania Railway system, died at his home in Philadelphia on March 18. Mr. Firth was for 25 years the head of the Anchor line and, though his headquarters were always in Philadelphia, he was very well known along the chain of great lakes. He served for one year as president of the Lake Carriers' Association, but was a regular attendant at all of its meetings until his retirement in 1906. Mr. Firth was a man of unusual ability and most charming personality. Upon his retirement from active business he devoted a great deal of his time to hospital work in connection with the Germantown hospital. In addition he spent his leisure in writing books on religious subjects. One of his works, "Christian Unity in Effort," is a record of some personal thoughts and beliefs and represents his conviction that every man and woman should acquire by individual effort some simple religious knowledge and personal faith as is essential to a well-rounded life.

Abraham Snyder, secretary and treasurer of the Buffalo Gasolene Motor Co., died at Buffalo on March 12, aged 67 years. He entered the power boat field in its infancy, being one of the organizers of the Buffalo Gasolene Motor Co., and he occupied a foremost position in marine engine construction of this type until his death. He was widely known in the trade, taking a keen and active interest in the affairs of power boat organizations throughout the country.

Edward Sabine Renwick, a noted inventor and patent expert and author of "Practical Invention," died March 19 at Short Hills, N. J., aged 90 years. After leaving college, Mr. Renwick became superintendent of an iron works in Wilkes Barre, Pa., but after 1849 devoted his time to serving as an expert in patent cases. In 1862, with his brother, Henry B. Renwick, he won distinction by repairing the steamship Great Eastern while afloat, replacing a fracture in the bilge 82 ft. long and 10 ft. in greatest width. He was a member of the American Society of Mechanical Engineers and other societies.

William Charles Towen, president of the Eastern Shipyard Co. and vice-commodore of the National Yacht Club, died March 19 at the Hotel Knickerbocker, New York, at the age of 54 years. He was born and educated in Detroit, Mich., and served in the United States navy from 1875 to 1879, being attached to the Vermont and to the Tennessee. He was a vice president and director of the Frazer Hollow Boat Co.

Thomas Green, chief engineer of the Soo Line, died at Minneapolis on March 28, after an illness of several months. He was 48 years old.

Samuel Davis, chief engineer of the steamer Mary C. Elphicke, died suddenly at his home in South Chicago, on March 17.

Naval Constructor Robert William Steele died at his home, Spring Lake, N. J., on Feb. 29. He entered the service as master shipwright in 1861.

He was commissioned naval constructor in 1875, and during his long life superintended the construction of many boats in various yards.

Fred Pansing, well known to the marine trade, through the uncommon excellence of his marine paintings, died at his home in Jersey City, on March 13, at the age of 68 years.

Captain David A. Kiah, Ogdensburg, N. Y., died on March 12 while on a visit at Detroit. He was 72 years old.

Capt. William Bell died at Toledo, on March 9, at the age of 85 years. He entered the ship building business in Toledo in 1856, but retired about 10 years ago.

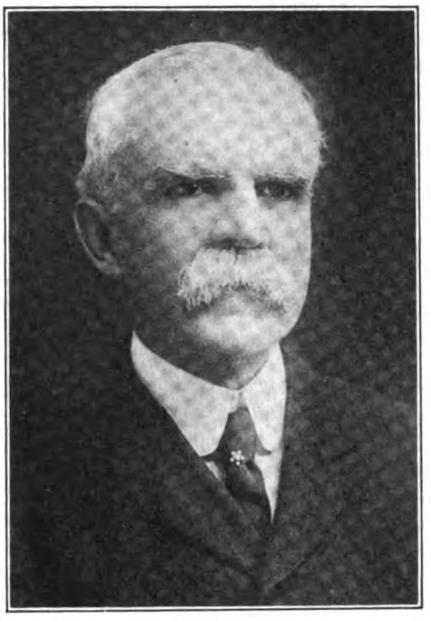
Capt. Louis Talbot, 89 years old and said to be the oldest navigator on the lakes, died at Buffalo on March 20.

Raising the Dry Dock Dewey

In the February MARINE REVIEW was published the discussion by William T. Donnelly on Naval Constructor L. S. Adams' paper, "Raising the Dry Dock Dewey", as read before the November meeting of the Society of Naval Architects and Marine Engineers in New York. The subject, however, is hardly complete with Mr. Adams' reply and additional comment prompted by Mr. Donnelly's remarks. It is appended herewith:

"Mr. Donnelly notes that only the barest details of the various parts of the work were given in the paper. There were in reality a great many annoying difficulties encountered in the course of the work, but their description would have taken up so much space that I deemed it unwise to attempt to cover them in the paper, and I, therefore, confined the paper only to the main points of the work as a whole, which were necessary for a full understanding of the subject.

"Mr. Donnelly seems to have inferred from my paper that there was considerable leakage through the bulkheads themselves. As a matter of fact, I think there was little, if any, leakage through the bulkheads except at the very tops, which, I think, contributed very little to the flow of water from one side to the other. So far as I know from my experience in handling the dock, and also in raising it, all bulkheads were watertight at the bottoms and sides. I believe that the non-watertightness at the tops was a part of the original construction. Under operating conditions the tops of these bulkheads need not be watertight. It was only in the work of raising that such non-watertightness at the tops proved disadvantageous, as it allowed the compressed air to go from one tank to another all over the dock, and thus prevented raising by compressed air alone. The leakage of water from one tank to another encountered in raising,



FRANK J. FIRTH

was, in my opinion, practically entirely through leaky or broken valves and corroded piping and much of it is inherent in the quick opening valves and it cannot be avoided with this arrangement for drainage and pumping. Mr. Donnelly seems also of the opinion that the experience with this dock would make it seem desirable to reduce the number of interior bulkheads. Personally, I am of the opinion that this is not desirable. I think the bulkheads in the Dewey are very well arranged so that they give a very strong structure and one which is also easily handled and controlled in docking vessels. To reduce the number of bulkheads would reduce the facility of handling and controlling the dock and would also lessen the factor of safety in case of damage to the bottom. In further reference to the supposed leakage through these bulkheads, I might add that, in installing the manhole covers preparatory to the attempt to raise by compressed air, several of the bottom tanks were found to already contain some air, which would not have been the case had there been appreciable leakage through the bulkheads.

"In regard to the point brought out by Mr. Donnelly relative to the advisability of distributing the pumping units rather than having the control from a central point through a single drainage system piercing the various bulkheads, I believe it more satisfactory to retain the control from a central point, as fitted on the Dewey. This method makes it far easier to handle and control the dock in docking vessels, and I believe that the small advantage to be gained by distributing the pumping units and making the bulkheads tight, which advantage would be manifest only under some few possible conditions of submergence of the whole dock, should be sacrificed for the much greater gain in ease of control under working conditions. The drainage piping of the Dewey was all black iron pipe. It would have been better had this been galvanized, as it would have lasted longer and would not have corroded so readily.

"Mr. Donnelly also brings up the point of the advisability of providing reserve compartments of sufficient buoyancy to float the dock irrespective of the ballast or buoyancy compartments used for operating the dock and he suggests that such reserve compartments be provided with their own separate pumping systems. In this connection I understand that, in preparing the design for the Dewey, the question of installing a safety deck low down in each side wall was carefully considered and finally abandoned on the ground that, in case the dock were lowered to take in a vessel, and, should the structure be then damaged above one of these decks, the safety deck would become a positive menace owing to the difficulty of getting the water above it to the pumps below. Personally, I agree with Mr. Donnelly that reserve buoyancy compartments should be provided and that they are very desirable if not positively necessary to insure the safety of the dock. Many things might happen below water which would result in accidental sinking. A valve might become jammed open, pipes might corrode in unexpected or unknown places, one of the flexible drain pipe connections between pontoons might give way, the dock might be struck by a torpedo or by shells from the enemy, it might be accidentally rammed by a vessel in docking, etc., etc., and damage to one of the large compartments, Nos. 1 or 7 would be an especially serious matter, particularly if the dock were lowered to take in a vessel.

"I think the best, and possibly the only really practicable, form of reserve buoyancy compartments would be obtained by providing a safety deck low down in each side wall. The machinery decks should also be made completely watertight. Then the spaces above both the safety and the machinery decks should be minutely subdivided into many comparatively small watertight compartments, and the bulkheads should not be pierced by doors or other openings. In this manner the dock could be made practically unsinkable, except by almost total destruction, and at a comparatively small additional cost. If

these reserve compartments were properly designed to provide a suitable excess in reserve buoyancy, several of them could be laid open to the sea, through damage, without reducing the reserve buoyancy to such an extent as to permit the sinking of the dock; and no drainage system would be necessary for them. I think the comparatively small additional cost of such a construction would be amply justified by the great gain in safety and the insurance against accidental sinking.

"In conclusion I wish to state that, on the whole, I think the Dewey a very well designed and efficient dock and I would not advocate any radical changes in future designs except to provide reserve buoyancy compartments as outlined above. There are, of course, some minor points where improvements might be made, but these are not of sufficient importance to be considered here."

The Lake Season of 1912

It is Expected that the Season Will Recoup the Losses of 1911—Hull Insurance—Dock Charges—Indictments Quashed

MANY things of importance happened in lake circles during the past month, and indications are that the year 1912 will recoup the losses of 1911. Navigation will officially open on April 15, when the insurance rates become operative, but practically it will not open until May 1. The rivers are still filled with ice and the independent vessel owners are not eager for an early start. The later the start, the brisker will be the season. Considerable ore has already been sold, the buying being stimulated, of course, by the extremely low prices which work out at a reduction of 75 cents for old range and Mesabi Bessemer and 65 cents for old range and Mesabi non-Bessemer from last year's prices, making old range Bessemer $3.75, Mesabi Bessemer $3.50, old range non-Bessemer $3.05 and Mesabi non-Bessemer $2.85. Furnacemen, confident that prices could not go lower, have been liberal buyers. In fact, it is doubtful if this scale of low prices will obtain much longer, as shippers are already exhibiting some reluctance to sell at these figures. These prices are lower than any that have obtained since 1904 and will result in sending more lake ore east of the Alleghenies than ever before.

Corrigan, McKinley & Co. early in the month announced that they had contracted for tonnage to move 1,000,000 tons of ore at 40 cents from the head of the lakes, a reduction of 5 cents from last season's rate. The leading vessel interests all denied that they had taken any of this ore and Corrigan, McKinney & Co. declined to divulge the names of the contracting parties. The trade was somewhat skeptical about this news at first, but subsequent developments tend to prove that the tonnage has actually been covered at these figures. It is quite easy to see wherein an owner of a bonded vessel who had been without any business to speak of for nearly two years, would tie up his tonnage at a figure that would insure, at any rate, the interest on his bonds, if nothing else. It is even intimated that continuing contracts have been made on this basis, covering a period of three or four years.

On the other hand, about 100,000 tons has been placed at 45 cents, and some of the vessel men say that they will run wild rather than take less. The unloading charge will also be reduced. Last year the vessel paid 15 cents per ton for unloading and it is expected that this year the charge will be 10 cents a ton. Some effort has been made to establish the unloading charge at even a lower figure but some of the less modern docks claim that they cannot operate profitably at a lower figure. Should the unloading charge be fixed at 10 cents, as is likely, the rate from the head of the lakes will be 55 cents during 1912.

In order to reduce expenses a number of the lake fleets have been operating without insurance during the past few years. G. A. Tomlinson, of Duluth, has now added his fleet to this class and will operate 14 setamers without insurance during the coming season. Six steamers of the Acme Transit Co. will also operate without insurance during the season. The other companies that carry their own insurance are the Pittsburgh Steamship Co., Great Lakes Steamship Co., Wilson Transit Co. and the Cleveland Steamship Co.

Underwriters have fixed the rates for hull insurance for the season of 1912. To begin with the valuation of the vessels has been reduced from $53.50 to $51.00 per gross ton, a reduction of $2.50, which means a saving of ¼ of 1 per cent. The underwriters have also been persuaded to create a preferred class of tonnage which have been given a reduction of ½ of 1 per cent over the rate of last year or 5¼ per cent. For vessels not in the preferred class the rate will be the same as last year, or 5¾ per cent, though of course they will have the benefit of the reduction in valuation. The preferred list has not as yet been announced and vessel owners are naturally looking forward to it quite anxiously. These insurance rates have been brought about by the efforts of the Great Lakes Protective Association to minimize the dangers of navigation on the lakes. No change was made in the insurance season, which will begin on April 15 and end Nov. 30.

Lake Erie docks held a balance of 9,131,664 gross tons of ore on Dec. 1 last. Since that time 2,098,739 tons have gone forward to furnaces, leaving a balance on dock as of April 1 of 7,032,925 tons. Lake Erie docks held a balance of 6,687,325 tons on May 1, 1911, and as the movement has been brisker this year than last, it is expected that there will be considerably less ore on dock May 1 than there was at that time last year. In fact, it would not be surprising if the docks held 750,000 tons less than last year as the movement to furnaces has increased materially of late, some of the docks working to their full capacity. On the other hand, shipments from upper lake ports are not expected to begin until May 1. It may be later than that before the fleet actually gets under way.

During the month indictments returned against Dan R. Hanna and R. L. Ireland of the firm of M. A. Hanna & Co., and D. T. McCabe, of the Pennsylvania railway, for rebating ore-handling charges at Lake Erie docks, were quashed. Fines, however, were imposed upon railways and dock companies as follows:

Pennsylvania Co., $20,000 for rebating and $10,000 for conspiracy to rebate, total $30,000.

Lake Shore & Michigan Southern Railway Co., $15,000 for rebating and $5,000 for conspiracy, total $20,000.

Bessemer & Lake Erie Railroad Co., $20,000 for rebating and $10,000 for conspiracy, total $30,000.

The New York, Chicago & St. Louis Railway Co., $3,000 for rebating.

The Ohio & Pennsylvania Dock Co., $10,000 for conspiracy.

The Union Dock Co., $7,000 for conspiracy.

The Ashtabula Dock Co., $6,000 for conspiracy.

The Pittsburgh & Conneaut Dock Co., $7,000 for conspiracy with the Lake Shore and $10,000 for conspiracy with the Bessemer & Lake Erie railroad, total $17,000.

Total fines imposed, $123,000.

These indictments were returned a year ago as a result of an investigation by the Interstate Commerce Commission of the practice of the companies involved in returning certain allowances to shippers, the money being derived from the excess earnings of the dock companies.

The fines, in our opinion, while cheerfully paid, were unjustly imposed. The whole situation appears to be one inseparable from its sudden development. It has all been brought about by the rapid and marvelous efficiency of the unloading appliances on Lake Erie docks, making adjustment of costs beforehand absolutely impossible. The case was very clearly told by R. C. Butler, counsel for the dock companies. In fact, everyone interested in lake trade is advised to read it because it makes the subject, which has probably been more or less of a muddle in many minds, absolutely clear. Mr. Butler said:

Mr. Butler's Address

"On behalf of D. T. McCabe, Dan R. Hanna, R. L. Ireland, the Pennsylvania Co., and the Ohio & Western Pennsylvania Dock Co., the defendants in case No. 3458, indicted under section 5440 for conspiracy to violate the Elkins act, and on behalf of the Pennsylvania Co., defendant in case No. 3465, indicted for violation of the Elkins act, I desire briefly to call to the court's attention the history of the handling of ore over Lake Erie docks, with particular reference to the relationship between the Pennsylvania Co., its docks, and shippers of ore over its docks via its lines. A knowledge of these conditions is necessary to a fair consideration of the specific facts upon which the indictments are based.

"As early as the year 1890, certain shippers of ore over other lines than those of the Pennsylvania Co. had associated themselves together, as they had a right to do, either in co-operative companies or by the organization of corporations for the more satisfactory handling of ore over docks at Lake Erie ports and for the enjoyment of the net profits arising therefrom. These arrangements, while not contrary to the provisions of any law on the statute books as then interpreted, necessarily created preferences in favor of the shippers of ore who were parties thereto. Shippers of ore via the Pennsylvania lines enjoyed no such preferences, as the Pennsylvania Co.'s docks were operated by contractors who were not shippers of ore. This discrimination against its ore shipping patrons caused the Pennsylvania Co. to announce on May 1, 1891, by a public circular addressed to "Consumers of Iron Ore", that in order to place consumers of ore moving via its docks on an equality with consumers of ore passing over the docks of other lines via Lake Erie ports, the Pennsylvania Co. would thereafter cause to be divided among all consumers of ore whose shipments were handled over its docks the net profits which might arise from the operation of such docks, the division of such profits to be in the ratio that the number of tons handled and transported over the Pennsylvania Co.'s lines for each consumer bore to the total tonnage so handled. The notice of May 1, 1891, was given wide distribution among shippers and consignees of ore throughout the entire territory reached by the Pennsylvania and other lines from Lake Erie ports, so that all consumers of ore were fully advised that if their ore passed over the docks of the Pennsylvania Co., not only would there be no discrimination by the Pennsylvania Co. as between any shippers of ore over its own lines, but also that the discrimination theretofore existing in favor of the certain ore shippers enjoying the profits of the operation of docks belonging to other cariers would be reduced to a minimum. The policy announced by the Pennsylvania Co. in the published notice of May 1, 1891, has been consistently followed up to the present time and, so far as it was within the power of the Pennsylvania Co. so to do, the ore which has passed over its docks has been kept upon an equality with the ore passing over the docks of other carriers at Lake Erie ports.

Wonderful Increase of Tonnage

"The first ore delivered by vessels at Lake Erie ports was unloaded by shoveling it into tubs or half barrels in the hold of the vessel, then hoisting the tubs or half barrels by horse power, dumping the ore into wheelbarrows at the vessel's side and wheeling it to the cars or to storage piles on the docks. As years passed by, the receipts of ore at the docks of the Pennsylvania Co. grew from 22,000 tons in 1862 to nearly 800,000 tons in 1890, and to more than 3,000,000 tons in 1907. This tremendous increase in ore tonnage was necessarily accompanied by an evolution in ore-handling machinery; so that, whereas in 1890 it required four or five days' time to unload a vessel carrying 3,000 tons of ore, at the present time a vessel carrying 10,000 tons of ore can be unloaded in four or five hours.

"The profits from the operation of the docks arise from two sources: First, the vessel unloading charge, meaning thereby the amount paid by the vessel for lifting the ore from the hold and carrying it to the vessel's rail; and, second, the charge paid to the dock company by the railroad company for transporting the ore from the vessel's rail and placing it either directly on the car, or first onto the dock for temporary storage and later onto the car. During the period under consideration, that is, from 1890 up to the present time, the amount collected by dock companies from vessels for unloading has varied from 13½c to 22c per ton, the usual charge being 20c. The customary charge by dock companies to rail carriers for carrying the ore from the vessel's rail to on board cars, whether direct or via the dock, was 20 cents per ton. The aggregate charge of the dock company, therefore, against the vessel and the rail carrier varied during this period from 33½ cents to 42 cents per ton. During the years 1908 and 1909 the dock company's charge to vessels was 20 cents and to the rail carrier 20 cents, making its aggregate charge during these years 40 cents per ton.

Figuring on Profits

"At about the time the circular of May 1, 1891, was issued by the Pennsylvania Co., careful calculations were made by the company based on its past experiences as to the net profits arising from its dock operations, and it was ascertained that, taking one season with another, there was a net profit to the dock company of about 12 cents per ton on direct ore, that is, ore handled directly from vessels to railroad cars and forwarded at once to destination, and a net profit of about 5 cents per ton on dock ore, that is, ore on which immediate forwarding from the vessel was not desired by consumers and which consequently had to be unloaded and stored on the dock and later on at the convenience of the consumer

reloaded onto railroad cars and forwarded to destination. Accordingly, beginning May 1, 1891, the Pennsylvania Co. began paying currently, that is, monthly, to consumers of ore handled over its docks allowances of 12 cents per ton on direct ore and 5 cents on dock ore, which were in the nature of rebates on the freight rate paid by consumers. These allowances were made to all consumers of ore without preference or distinction, and insured exactly equal treatment to all patrons of the Pennsylvania Co. The payment of these allowances was subsequently published in the tariffs of the Pennsylvania Co. and was continued from May 1, 1891, up to the first day of August, 1909. All other carriers reaching Lake Erie ports, it is understood, made the same allowances to all consumers on their lines; but some of the carriers in addition to making such allowances, in order to secure the efficient management of their docks permitted certain consumers of ore to operate the docks and reap the benefit of the net profits arising from such operation, to which we shall now refer.

Inequality Explained

"For several years after May 1, 1891, the allowances of 12 cents and 5 cents per ton above referred to represented approximately, if not actually, the net profits of the dock operations; but, beginning perhaps as early as the year 1905 or 1906, the increased tonnage handled over Lake Erie docks, together with the improvement in ore-handling machinery, caused the accumulation of additional surpluses or net profits at the end of each year after paying the 12-cent and 5-cent allowances. In other words, the profits of the dock operations began at about this period to exceed the allowances of 12 cents on direct and 5 cents on dock ore which all carriers had been paying to shippers via their respective lines. In the case of the Pennsylvania Co., all such additional surpluses or net profits went into the treasury of that company. In the case of some of the other carriers, such surpluses or net profits went to the dock companies. Therefore, consumers of ore whose shipments passed over the docks of the Pennsylvania Co. were no longer on an equality with consumers who were interested in dock companies on the lines of some of the other carriers.

"Being desirous of distributing the *entire* profits of its dock operations ratably among the consumers of ore on its lines and in pursuance of its long continued policy that ore shipments handled over its docks should be on an equality in so far as it was within its power so to make them with ore shipments handled over the docks of other carriers, the Pennsylvania Co. entered into a contract effective April 1, 1908, by the terms of which the Ohio & Western Pennsylvania Dock Co. was to operate the docks of the Pennsylvania Co. at Lake Erie ports. By the terms of this contract, the dock company was required to distribute ratably among all consumers of ore on the Pennsylvania lines the entire profits of the operation of said docks during the existence of said contract, and this in *addition* to the published tariff allowances of 12 cents on direct and 5 cents on dock ore, which the company also required the dock company to pay. It was obviously impossible to ascertain until after the close of any one year what the exact amount of such net profits would be. This rendered it impossible for the Pennsylvania Co. to state in its published tariffs the exact amount that would be repaid to consumers.

"It was believed by the officers of the Pennsylvania Co. that in making such an arrangement for the distribution of the profits of its dock operations, the broad spirit of the provisions of the act to regulate commerce was being carried out, as such an arrangement guaranteed to every consumer whose ore passed over the docks of the Pennsylvania Co. that he would be treated with strict impartiality whether his shipment amounted to one carload or hundreds of carloads. Publicity of this contract and of its contents was assured by the fact that the compensation of the dock company was upon a per ton basis, and it is not at all probable that there was a shipper or consumer of ore in the entire territory reached by the lines of the Pennsylvania Co. who was not fully aware of the new arrangements made for the distribution of those net profits. Counsel advised that it was not necessary to make reference in the tariffs of the Pennsylvania Co. to the proposed disposition of the possible surplus; that the rights under which the law of each individual consumer of ore were properly and legally safeguarded, and unjust discrimination of every character absolutely avoided.

"The indictments returned in this court against the Pennsylvania Co. and the Ohio & Western Pennsylvania Dock Co. are predicated upon payments made to consumers of ore of the net profits of dock operations from April 1, 1908, to August 1, 1909, as provided by the terms of the contract referred to. The indictment against D. T. McCabe, Dan R. Hanna and R. L. Ireland was returned because of the fact that their signatures appeared upon the contract, Mr. McCabe signing on behalf of the Pennsylvania Co., Mr. Hanna on behalf of M. A. Hanna & Co., and Mr. Ireland as a witness to Mr. Hanna's signature."

"It is upon this state of facts that the indictment against the individual defendants is justifiably nolled by the government. It is also upon this state of facts that the Pennsylvania Co. under advice of counsel is now constrained to enter its plea acknowledging a technical violation of the Elkins act, and that the Ohio & Western Pennsylvania Dock Co., under like advice, and in order to terminate this criminal proceeding in an amicable manner, enters its plea of *nolo contendere*, vigorously denying its guilt as well as the willful or intentional wrongdoing of any of its officers or agents. It is emphatically asserted by all these defendants that there was no purpose or intention to do wrong to any person or injustice to any locality, and it is even more emphatically maintained that the liberal provisions of the contract in question were in furtherance and not in contravention of the general purpose of the act to regulate commerce. And in this view we are pleased to know the high officials of the United States government, charged with the duty of enforcing the act, concur."

I. O. C. System at Navy Yards

The International Oxygen Co. have recently completed an installation of an I. O. C. system oxy-hydrogen generating plant by the electrolytic process for the navy department, at the Brooklyn navy yard. The capacity of the plant is 3,500 cu. ft. of oxygen and 7,000 cu. ft. of hydrogen per 24 hours. The navy yard previously generated its oxygen by a chemical method, but found this inadequate for their needs.

The I. O. C. system gives complete satisfaction, both as to efficiency and the quality of the gases produced. The purity of the gases is of great importance where the question of first-class work is concerned, as in the Brooklyn navy yard. In addition, the cost of producing the gases by the I. O. C. system is but a fraction of the cost by the former method.

The I. O. C. plant is practically automatic. As soon as the current is turned on, the generators produce gas, which passes to the gas-holders, and is then compressed into storage tanks.

Activity in Lake Ship Building

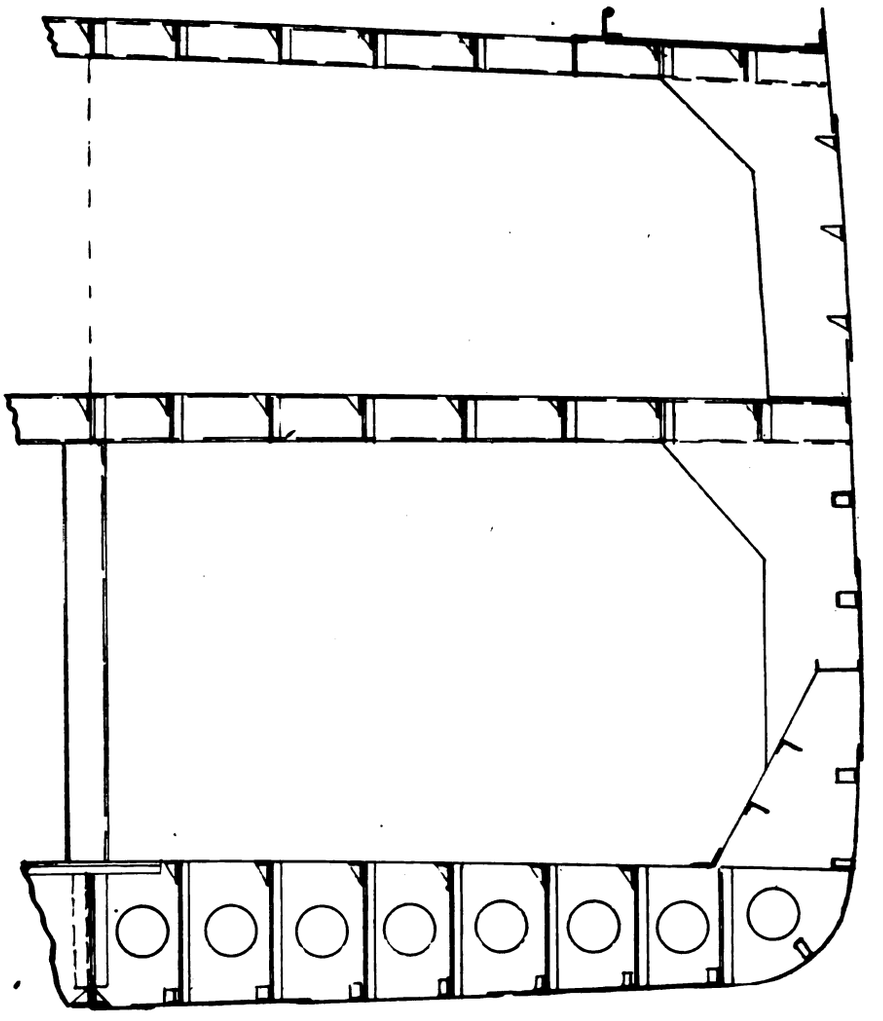
The American Ship Building Co. Gets the Contract for the Northern Navigation Co.'s New Passenger Steamer—First Launching at Ashtabula

THE American Ship Building Co. has secured the contract for building the new passenger steamer for the Northern Navigation Co., amended bids for which were submitted by the ship yards recently. The new steamer will be built at the yard of the Western Dry Dock & Ship Building Co., at Port Arthur, and is promised for delivery in June, 1913. The new steamer will be somewhat larger than the Hamonic, being 385 ft. long, 52 ft. beam and 28 ft. 9 in. deep.

The bulk freighter Louis R. Davidson was launched from the Ashtabula, O., yard of the Great Lakes Engineering Works, on Saturday, April 6. It was the yard's initial launching and in fact the first steamer to be launched in Ashtabula in 40 years. The Davidson is building for Boland & Cornelius, of Buffalo, and is 524 ft. over all, 504 ft. keel, 56 ft. beam and 30 ft. deep.

The launching took place under the auspices of the chamber of commerce of Ashtabula, the chamber giving a dinner to the officials of the ship yard. It was announced at the dinner by President Pessano, of the Great Lakes Engineering Works, that the keels for two steamers for salt water service will be laid at the yard immediately.

R. B. Wallace, general manager of the American Ship Building Co., closed contract in New York on April 4 for the construction of an oil barge for the Standard Oil Co., to be built on the Isherwood system. The barge will be 260 ft. over all, 250 ft. keel, 43 ft. beam and 25 ft. deep, and will be built at Lorain.

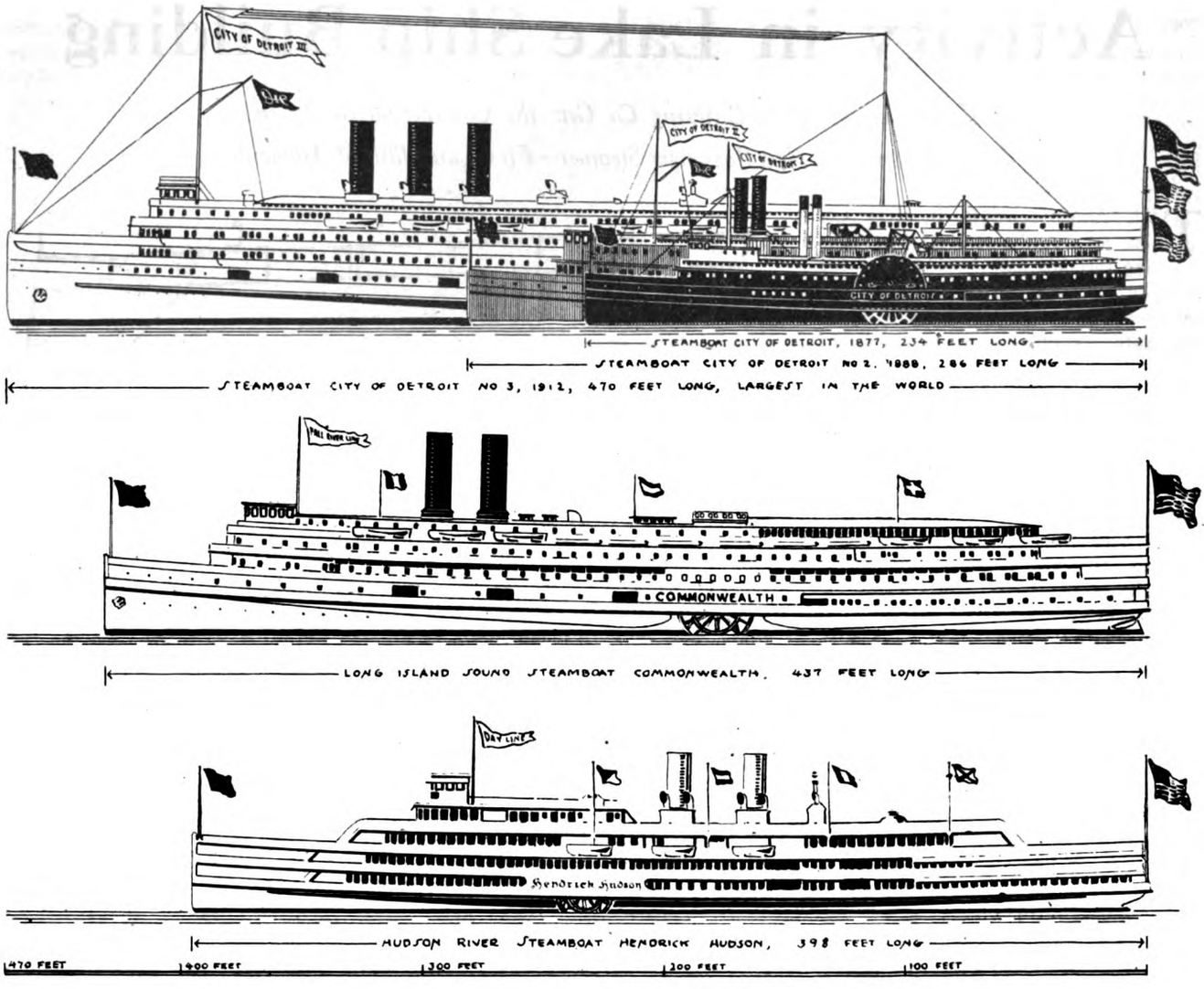


MIDSHIP SECTION OF STEAMER BUILDING AT PORT ARTHUR FOR NORCROSS & CO., OF TORONTO

The conveying steamer Calcite, building for the Calcite Transportation Co., Calcite, Mich., was launched from the yard of the Detroit Ship Building Co., at Wyandotte, on March 30, being christened by Miss Elva A. Farr, daughter of M. E. Farr, president of the Ship Building company The Calcite is intended for the crushed stone trade and is 436 ft. long, 54 ft. beam and 29 ft. deep.

The passenger steamer City of Grand Rapids, building for the Graham & Morton Transportation Co., of Chicago, was launched from the Cleveland yard of the American Ship Building Co., on March 16, being christened by Miss Helen Sebastian, of Toledo, daughter of L. H. Sebastian, fleet engineer for the transportation company. The new steamer is intended for service on Lake Michigan and is promised for delivery June 15. The leading dimensions are: Length over all, 310 ft.; between perpendiculars, 291 ft.; beam, 48 ft., and depth, 27 ft. She will have a four-cylinder, triple-expansion engine, with cylinders 26, 42, 51 and 51 in. diameters by 42-in. stroke. Steam will be supplied by six Scotch boilers, 12½ ft. in diameter and 11½ ft. long, allowed 200 lb. pressure and fitted with Ellis & Eaves draft. Her construction up to the promenade deck is entirely of steel. The first cabin will be finished in mahogany with dining room forward. The steamer will have 210 staterooms. The new vessel will have the usual appliances for safety and convenience.

The Western Dry Dock Co., Port Arthur, Ont., expect to complete the steamer, which they are building for the Norcross interests, of Toronto, sometime in May. This steamer is of Canadian canal size, being 257 ft. over all, 244 ft. keel, 42 ft. 6 in. beam and 26 ft. 6 in. deep. The vessel is being built on the Isherwood system and has the tank carried up the side, displacing the steel ceiling. This is an advantage over vessels with ceiling in the bilges because, in the event of damage in the canals, the water instead of going in through the ceiling will go into the water bottom, thus not disturbing the cargo. The raised tank extends from the boiler room to the forepeak. The Norcross interests are also having a vessel built on the Clyde, to be equip-



SCALE DRAWING SHOWING DEVELOPMENT OF DETROIT & CLEVELAND NAVIGATION CO.'S STEAMERS AND COMPARISONS WITH LARGEST LONG ISLAND SOUND AND HUDSON RIVER STEAMBOATS

ped with a two-cycle, four-cylinder Deisel engine.

The Western Co. are also building a stern wheel passenger vessel for the Canadian Pacific railway, at Nelson, B. C., to be ready for shipment in July. This steamer is 200 ft. long, 40 ft. beam and 8 ft. deep. A small steamer, 40 ft. by 10 ft. by 5 ft. is also being built for yard use about the river. The company employs about 400 men. A number of vessels are waiting for the dry dock to undergo repairs.

The Detroit Ship Building Co. expects to give the new sidewheel steamer City of Detroit III, which is building for the Detroit & Cleveland Navigation Co., its builders' trial on May 15. Unusual progress has been made upon the steamer during the past few weeks, and she will undoubtedly be ready for service well before June 15, which is the date that the steamship company has scheduled to put her in commission between Detroit and Buffalo.

The American Ship Building Co. was also the lowest bidder for the construction of a proposed steel fire tug for the city of Cleveland.

It is reported that the Great Lakes Engineering Works, of Detroit, has secured orders for three steamers for salt water service.

New C. & B. Line Steamer

The new steamer which the Detroit Ship Building Co. will build for the Cleveland & Buffalo Transit Co., from designs by Frank E. Kirby, will be the largest side-wheel passenger steamer in the world. The leading dimensions are: Length on deck, 500 ft.; breadth on deck, 98 ft. 6 in.; depth, 23 ft. 6 in.; draught of water, 15 ft. The hull will be built entirely of steel and her decks up to and including the promenade deck, will also be of steel. The hull will be divided into 12 watertight compartments and a double bottom will be provided throughout the entire length of the ship. For convenience of handling in the narrow channels double rudders will be fitted.

The propelling machinery will consist of a three-cylinder compound engine, having one high pressure cylinder, 66 in. diameter, and two low pressure cylinders, 96 in. diameter, each with a stroke of 9 ft., driving feathering paddle wheels, 32 ft. in diameter. Steam will be supplied by six single-ended and three double-ended boilers. Three turbine electric generators will supply current for over 5,000 lamps as well as power for motors and fans. There will be over 500 staterooms, several of them with private baths. All staterooms will have running water and telephones.

The passenger entrance will be on the after quarters, opening into a spacious lobby, about which are arranged the purser's, steward's and other offices of the ship. The dining room will occupy the whole after part of the main deck, subdivided into alcoves with bay windows, permitting an outlook over the water. Three large private

dining rooms are also provided with buffet at the extreme after end.

The main saloon, which is approached from the lobby by a wide staircase, is upwards of 400 ft. long and is subdivided for convenience into several sections, including palm garden, smoking, lounge and observation rooms. This saloon has a wainscot of mahogany and upper part of French grey. The ceiling and panel on the cross bulkheads will have decorative paintings by William de Leftwich Dodge, of New York.

Fresh, clean air will be supplied throughout the entire vessel by four electric-driven machines, fitted by the McCreary company. The new steamer will come out in 1913.

Launch of Torpedo Boat Destroyers

THE United States torpedo boat destroyer Henley was launched from the yard of the Fore River Ship Building Co., Quincy, Mass., on April 3, being christened by Miss Constance Henley Kane, grand daughter of Capt. Robert Henley, after whom the Henley was named. The Henley's principal dimensions are:

Length between perpendiculars	289	0
Length overall	293	10½
Breadth molded	26	4½
Trial displacement	742	tons
Trial draught	8	4

Battery: 5—3-inch guns.
3—45 c-m torpedo tubes on deck.
2—0.30 caliber automatic guns.

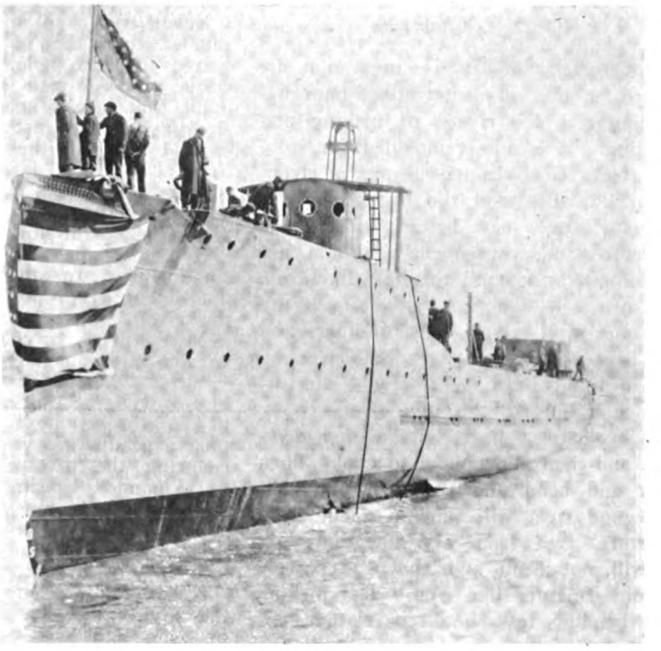
The contract was signed on Nov. 28, 1910, and calls for delivery on Nov. 28, 1912.

The vessel is flush-decked all fore and aft with a top gallant forecastle, giving a high platform for the forward gun with good height for conning tower and steering stations while contributing to the sea-going qualities of the ship.

The captain's and officers' staterooms, wardroom and conveniences are arranged in the forecastle while on berth deck immediately below these are quarters for part of the petty officers and crew, the remainder being berthed aft.

The machinery spaces occupy the amidship portion of the destroyer, the installation consisting of four Fore River-Yarrow water tube boilers. The vessel is fitted with two 18-stage Curtis reversible marine turbines, 63 in. in diameter and capable of developing 5,500 S. H. P. each, at about 585 revolutions per minute, which will give the vessel a speed of 29½ knots per hour.

For the purpose of bettering the economy of consumption of steam at low speeds there has been fitted at the forward end of each turbine, and connected to it by means of a jaw clutch, a 10½-in. x 22-in. x 10-in. stroke vertical, compound, reciprocating engine, which at 16 knots is intended to develop 400 I. H. P. at 280 R. P. M., with a steam pressure of 250 lbs. in the high pressure chest. The steam, after passing through this engine, is put through the turbine and the energy remaining in the steam after passing through the reciprocating engine is extracted down to the last ounce of pressure in the turbine. Shop tests of this unit conducted by a naval board last December, showed, according to the report of the board, that the gain in economy at 16 knots amounted to 33 per cent, at 13 knots, 62.4 per cent, and at 10 knots 98.96 per cent, over the performance of the turbine under similar conditions of steam. The contractors guaranteed that the gain at 16 knots would be 25 per cent. It is expected that the Henley will be the most economical torpedo boat destroyer in the U. S. navy at all speeds from 10 knots up to 31. Subsequent destroyers of a larger displacement are to be fitted with a similar combination of turbine and reciprocating engines.



TORPEDO BOAT DESTROYER HENLEY IMMEDIATELY AFTER LAUNCHING

TORPEDO BOAT DESTROYER JARVIS
Photo by New York Ship Building Co.

The Henley is of the type of ocean-going destroyer capable of keeping the sea with the battle fleet.

Contract was awarded on the same date to the New York Ship Building Co., Camden, N. J., for the construction of the sister ship Jarvis, and this vessel was launched from the Camden yard on April 8, being christened by Miss Jean Knox.

McArthur Bros., of Chicago, were the lowest bidders for excavating Section 2 extending from the proposed third lock at the Sault to and including the embankment of the international bridge. Its bid was $670,235.

James Shewan & Sons, East River, New York, have purchased the Pensacola floating dry dock from the government. The dry dock is 450 ft. long, 108 ft. wide and 47 ft. deep. The dock will be towed to New York to supplement the existing Shewan plant.

Steel Rivets[1]

By D. J. Champion

Too much importance must not be placed on the very interesting, but misleading test for rivets, of nicking and bending. It is a test intended for iron, not steel. Good iron is fibrous in structure and will stand the test admirably, whereas steel may be of a granular structure and, consequently, should not be expected to stand this test like iron. If you are in doubt as to the superiority of one steel rivet over another and you are inclined to test the rivet by nicking and bending, I would suggest that you subject the two rivets to be compared to a heat suitable for driving, and then allow them to cool. Then nick and bend and you will find that the good rivet will show a good, clean fracture, free from crystallization; but it will not bend and show a coarsely fibrous fracture like iron. The nicking and bending test should never be used on a steel rivet to show fiber, as the structure of a good steel rivet may be finely granular instead of fibrous. Fine, fibrous structure is, of course, noticeable in a steel bar of small diameter after coming from the rolls. At this stage, the bar under the nicking and bending test would bend flat on itself without breaking and would show a finely fibrous structure. But we should not expect to get this result after the double heating which must be given the bar in order to make the rivet. United States government specifications do not require rivets to be subjected to the nicking and bending test. If made at all, it is only to show the appearance of the fracture.

The following suggestions may prove of value to some makers of boilers and other large users of rivets:

Hold some reliable maker responsible for the quality and workmanship of the rivets you drive.

Where the holes are not reamed, see that inside surfaces of the holes are parallel to each other without undue overlapping.

Heat rivets intelligently, grading the degree of heat to conform to the work you are doing, allowing hand-driven rivets to come to an almost white heat, pneumatic-driven rivets to come to a bright cherry red and hydraulic-driven rivets to a dull cherry red. Bear in mind at all times the amount of pressure your machine is capable of exerting on the rivets at the point of upset and regulate the heat accordingly. The lower the heat, the greater the pressure, relaxing the pressure when the rivet is cold, or nearly so. Such rivets will fill the holes and avoid undue shrinking, and possibly, calking. When high pressure work is being riveted, ream the holes 1/32 inch full only, as tighter work can then be done.

Never continue hammering, on either end of the rivet, until it is blue.

Never try to fill a hole with a rivet smaller than the regular diameter required for such hole, which in all good work is 1/32 inch larger, bearing in mind that steel expanded by compression, as in the case of a rivet shank expanded to fill the hole that is more than 1/16 inch larger, is materially weakened in all its qualities of strength. Therefore, the closer the fit, the tighter and stronger the joint.

Never use heavy penumatic tools on small rivets. In other words, never use a tool out of proportion to the size of the rivet.

Never drive a cold-made rivet cold without first annealing.

Never introduce a high pressure blast into a rivet-heating furnace unless the flame is broken by a fire wall, and even then a graduating valve should be used, reducing the pressure to a maximum of 15 pounds, bearing in mind that only sufficient rivets be placed in the fire as can be conveniently handled by the driver without allowing them to soak too long, or to become scaled.

Never allow your rivets to soak in the fire, either during the noon hour, or over night. If a cessation of work is contemplated, draw them out of the fire, and do not replace them.

[1]From a paper presented at the New Orleans convention of the American Boiler Manufacturers' Association.

Automatic Expansion Steam Trap

While in the employ of the Martin-Barriss Co., of Cleveland, John W. Barton conceived and put into operation an idea for an automatic expansion steam trap. It was fully tried out and proved very successful. The trap was originally constructed for a vacuum system, and has been found equally effective under gravity, either high or low pressure. Under the supervision of Mr. Barton a vacuum system was installed using about 40 traps. According to Mr. Martin's statement, it gave the plant a perfect heating and drying system and reduced the coal bill $3,000 per annum. This system was installed in 1907, and the traps have been working perfectly ever since without repairs. Mr. Barton continued to manufacture the traps in a small way until 1911, when The Automatic Steam Trap & Specialty Co. was formed to manufacture them. The company has met with considerable success and the traps have found their way into plants all over the country. A few of the essential features of the Barton trap are: Its simplicity and ease of operation, requiring but little attention from the engineer; the complete drainage of the water of condensation from the system and the entire expulsion of air; the absence of wearing from wire drawing, the broad expanse of the seat and disc reducing this to a minimum; the fact that it can be cleaned in fifteen seconds. The seat and disc are the only parts that will ever need repairing and they can be replaced in 15 minutes without removing the trap from the line.

The company will send the trap on approval to any reliable firm. Its office and factory building is located at 3735-3737 West Twenty-fifth street, Cleveland, O.

New Work at Cramps

Since the first of the year, the William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa., has secured contract to build a freight vessel for W. R. Grace & Co., to be 384 ft. long, 50 ft. 4 in. beam and 28 ft. 6 in. deep, with a displacement of 9,700 tons. She will have reciprocating engines and Scotch boilers with fuel oil burners.

The steamers Massachusetts and Bunker Hill are being fitted with additional passenger accommodations and other miscellaneous changes and converted into oil burners. Two vessels for the Southern Pacific Co. are being reboilered with three Scotch boilers, each fitted with oil burners.

Forty Buoy Lanterns

The Canadian government has placed an order with the Safety Car Heating & Lighting Co., of New York and Montreal, for 40 buoy lanterns. These lanterns have been developed by this company to meet the demand of lighthouse bureau requirements. They are supplied with improved flashing mechanism capable of giving a double characteristic, that is, one second light, one and one-half seconds dark, one second light and five seconds dark; the short and long dark periods alternating with one second light periods intervening. The lanterns are known as 200 mm., and will be used for coast and harbor and river lighting.

The Pacific Mail Steamship Co. has purchased a strip of land along the waterfront at Richmond, Cal., and is planning a system of docks and warehouses, the estimated cost of which is $1,000,000. It is announced that when completed the improvement will constitute the terminal of the line.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., has been given contract to build a steel lumber steamer, 299 ft. long and 44 ft. beam, for the E. A. Smith Lumber Co.

The Fore River Ship Building Co., Quincy, Mass., will build a fireboat for the city of Seattle, Wash.

Wheeler Shallow-Water Alarm

Editor MARINE REVIEW, Sir:—Having seen a sketch and report of the Wheeler shallow water alarm as used on the steamer Quincy A. Shaw in your January issue I thought that possibly more information in regard to the workings of this instrument would be appreciated by marine interests.

The first instrument of this kind actually in use was installed on the steamer Champlain at the Great Lakes Engineering Works, April 20, 1911. We left Detroit, April 25, bound for Allouez light. On the way up to the Sault the instrument was tried out and adjusted. After passing the Sault on the way up the sounding line was lowered into the water through an exit pipe placed for that purpose. The upper end was held on a drum at the main deck. While the steamer was going at a speed of 13 miles per hour the indicator in the pilot house indicated an accurate depth of 53 ft. and after clearing all shallow spots above this depth showed a constant depth of this amount. The instrument was kept working all the way to Allouez.

How the Alarm Works

When clearing Allouez on the return trip, the weather being hazy, the sounding line was lowered into the water and at a speed of 11½ miles per hour indicated 72 ft. This was continued all the way to the Sault. About 13 miles above Whitefish Point the alarm that was set at 70 ft. sounded for a minute, then stopped, showing that the line had dropped into deep water again. A little later the alarm again sounded when passing the shallow water abreast of Crisp Point. The least depth shown on this occasion was 60 ft. Passing Whitefish Point and running through several miles of ice the record was continually kept in the pilot house showing all shallow places until the line was pulled in at the locks.

After passing the locks the line was again lowered into the water to such a length as to sound all depths in the Sault river. This continued through all improved and unimproved parts. While on the way down stream a heavy snow storm came on and continued for several hours. When through the West Neebish channel the snow came on so heavy that there was no chance of seeing the shore for some time. During this time the record of the depth of water was kept on the indicator in the pilot house and checked for the position of the steamer on the chart. In this way passing several anchored boats we passed in the deep water of Lake Huron.

Setting the Alarm

After entering Lake Huron the sounding line was lowered to such a length as to indicate about 52 ft. By the course and speed I estimated that the steamer would arrive at the Thunder Bay Island shoals at a certain time and within five minutes of that time the alarm sounded and on examination it was found that the indicator was showing 42 ft. and for 25 minutes the indicator continued to give the varying depths as we passed over these shallow spots. After passing these shallow spots the line was lowered so as to indicate 72 ft. and the alarm was set at 70 ft. The instrument ran at this depth all night.

The next bottom was found when about an hour's run above the Corsica Shoals light ship. From this time until the time of taking in of the line at Detroit, there was a continuous record given in the pilot house at the same instant it was taken. When passing Detroit Mr. Wheeler placed a new line aboard for the purpose of securing greater depth. The weight of this line was about 1,000 pounds and at 11½ miles per hour would register 15 fathoms. This line was used at all times during hazy or foggy weather and never failed to record the passing of all shoals of 15 fathoms or less. One noteworthy instance in particular was late in November, bound from Escanaba to Midland, Georgian bay, with a cargo of ore, we left Poe's reef, the wind being almost a gale from the southeast, accompanied with rain. Making an allowance for drift I figured that we should bring to the southard of Cove Island at about 10 a. m. Land loomed up about two miles ahead on the port bow. Taking this for Cove Island we hauled to the northard, at the same time checking down. We could see an opening which in the mist appeared to be Cove Island passage. At this instance the alarm that was set for 13 fathoms rang in the pilot house and knowing that there was no shallow spots to the southard and west of cove of this depth we immediately changed our course to south and ran for three quarters of an hour, the alarm getting soundings which showed we were to the northard. We picked up the gas buoy off Cove Island and continued our trip to Midland.

The fall of 1911 in particular being one noted for a great amount of snow storms this instrument was of great service and I cannot help but believe it to be one of the most essential devices for the safe navigation and protection of life and property.

Yours very truly
F. A. DUPUIE,
Master Str. Champlain.

Marine City.

Diversion of Lake Water

Secretary of War Stimson on March 27 gave a hearing to a delegation representing Canadian shipping interests, which protested against granting a permit to the Sanitary District of Chicago, to increase the amount of water diverted from Lake Michigan through the Drainage Canal.

Those present and who made arguments were Andrew Allan, representing the Canadian Pacific and Canadian Northern Railway shipping interests; F. E. Meredith, K. C. of the Shipping Federation of Canada and the Canadian Pacific Steamship Lines; Daniel Mullen, St. John, N. B., representing the Canadian government; F. S. Spence, acting chairman of the Toronto Board of Trade; David Seith, secretary, Montreal, Harbor Committee; and Robert W. Reifert, of the Montreal Board of Trade.

Mr. Mullen, who was the principal speaker, declared that the treaty between the United States and Great Britain bearing on this subject contemplated that the use of these waters for domestic and sanitary purposes should be subserviant to navigation. Inasmuch as only one city—Chicago—is affected so far as domestic and sanitary uses are concerned, the navigation of two countries were affected. Navigation interests should obviously prevail. He said that a larger diversion of water would be unwarranted, as the water never is returned to the body from which it flows. An increase would greatly injure navigation in Lake Michigan and the St. Lawrence river. He stated it was the duty of the Canadian government to conserve the waters in which it had navigable interests and that these shipping interests are already subjected to heavy losses which would be increased if a greater diversion of water is permitted.

Mr. Allan, speaking for the shipping interests, said they were now subjected to heavy losses owing to low water. The Canadians are now engaged in constructing vessels of a deeper draught and if there is a greater diversion of water these ships cannot be profitably operated.

Mr. Meredith supplemented the argument of Mr. Allan.